FIRST AID TO THE INJURED

AS COMPANIONS TO
THIS BOOK—

"A CATECHISM OF FIRST AID."

BY

J. M. CARVELL, M.R.C.S., L.S.A.

(REVISED 1917.)

Price 9d.; by Post, 10½d.

"PROBLEMS IN FIRST AID."

BY

THE LATE L. M. FRANK CHRISTIAN, M.B.,

AND

W. R. EDWARDS, O.B.E.

Price 10d.; by Post, 11½d.

FIRST AID TO THE INJURED

ARRANGED ACCORDING TO THE REVISED SYLLABUS OF THE FIRST AID COURSE

OF THE

ST. JOHN AMBULANCE ASSOCIATION.

BY

COLONEL SIR JAMES CANTLIE,
K.B.E., M.A., M.B., F.R.C.S.,

Knight of Grace of the Order of St. John.
Honorary Life Member of, and Lecturer and Examiner to, the Association.

With Instructions on "Stretcher Transport," revised from those originally written by the late Sir JOHN FURLEY, C.H., C.B., *Knight of Justice of the Order of St. John*, in accordance with the Army Stretcher Exercises. Also a CHAPTER (being the Sixth Lecture for Females only), by E. MACDOWEL COSGRAVE, M.D., F.R.C.P.I., *Knight of Grace of the Order of St. John, Honorary Life Member of, and Lecturer and Examiner to, the Association.*

THIRTY-FIFTH EDITION, REVISED 1919 BY A SUB-COMMITTEE
First issue 1,683,000 to 1,732,000.

Price 1s. 6d. net; by post, 1s. 8d.

LONDON:
THE ST. JOHN AMBULANCE ASSOCIATION,
ST. JOHN'S GATE, CLERKENWELL, E.C. 1.

W. H. & L.C. 50,000/1/1920.

The Grand Priory of The Order of the Hospital of St. John of Jerusalem in England.

SOVEREIGN HEAD AND PATRON:
HIS MAJESTY THE KING.

GRAND PRIOR: H.R.H. THE DUKE OF CONNAUGHT, K.G.
SUB-PRIOR: THE EARL OF PLYMOUTH, G.B.E., C.B.
BAILIFF OF EGLE: COLONEL SIR HERBERT C. PERROTT, [Bt., C.H., C.B.

EXECUTIVE OFFICERS:

PRELATE.—The Archbishop of York.
CHANCELLOR.—Sir John P. Hewett, G.C.S.I., K.B.E., C.I.E.
SECRETARY-GENERAL.—The Right Hon. Evelyn Cecil, M.P.
RECEIVER-GENERAL.—Francis W. Pixley.
DIRECTOR OF THE AMBULANCE DEPARTMENT.—The Earl of Donoughmore, K.P.
CHAIRMAN OF THE BRITISH OPHTHALMIC HOSPITAL, JERUSALEM.—Colonel Sir Courtauld Thomson, K.B.E., C.B.
ALMONER.—Sir Dyce Duckworth, Bt., M.D., F.R.C.P., LL.D.
LIBRARIAN.—Edmund Fraser.
REGISTRAR.—The Right Hon. Lord Claud Hamilton.
GENEALOGIST.—Sir Henry Farnham Burke, K.C.V.O., C.B.
DIRECTOR OF CEREMONIES.—(Vacant).

ASSISTANT EXECUTIVE OFFICERS:

ASSISTANT RECEIVER-GENERAL.—Edwin H. Freshfield.
HONORARY SECRETARY OF THE BRITISH OPHTHALMIC HOSPITAL, JERUSALEM.—Lieut.-Col. J. T. Woolrych Perowne.
ASSISTANT HONORARY SECRETARY (FOR SCOTLAND) OF THE BRITISH OPHTHALMIC HOSPITAL, JERUSALEM.—John Horne Stevenson, M.B.E.

SECRETARY.—William R. Edwards, O.B.E.
ASSISTANT SECRETARY.—Duncan G. Monteith.
AUDITORS.—Price, Waterhouse & Co.
BANKERS.—The London County Westminster and Parrs' Bank Ltd., Clerkenwell, London, E.C.
CHANCERY: St. John's Gate, Clerkenwell, London, E.C.
Telegraphic Address: "Firstaid, London." Telephone: Central 903.

THE CHAPTER-GENERAL:

The Chapter-General consists of the Grand Prior, the Sub-Prior, the other Knights of Justice, the Prelate and the Sub-Prelates, *de jure*; the Officiating Chaplains; all members of the Council; not more than ten Knights of Grace and not more than six Esquires appointed by the Grand Prior.

KNIGHTS OF JUSTICE:

HIS MAJESTY THE KING
(Sovereign Head and Patron).

FIELD-MARSHAL H.R.H. THE DUKE OF CONNAUGHT, K.G., K.T., K.P., Etc. (Grand Prior).

COLONEL H.R.H. THE PRINCE OF WALES, K.G., G.C.M.G, G.B.E., M.C.

H.M. HAAKON VII., KING OF NORWAY, K.G., G.C.B., G.C.V.O.

LIEUT.-COL. H.R.H. PRINCE ARTHUR OF CONNAUGHT, K.G., K.T., G.C.V.O., C.B.

Maj. Sir Archibald Lamb, Bt.
Col. Sir Herbert C. Perrott, Bt., C.H., C.B. (Bailiff of Egle).
Col. Sir James Gildea, K.C.V.O., C.B.
H. J. Loftus.
Col. B. M. Dawes.
Gen. Sir Charles Warren, G.C.M.G., K.C.B., R.E.
Maj.-Gen. J. C. Dalton.
Lieut.-Gen. Sir Aylmer G. Hunter-Weston of Hunterston, K.C.B., D.S.O., M.P.
Col. The Lord William Cecil, C.V.O.
Col. The Marquis of Cambridge, G.C.B., G.C.V.O., C.M.G.
The Viscount Templetown.
Admiral The Marquis of Milford Haven, G.C.B., G.C.V.O., K.C.M.G.
A. F. G. Leveson Gower.
Col. F. A. H. Lambert.
Col. Sir Charles W. Murray, K.C.B.
The Earl of Ranfurly, G.C.M.G.
The Viscount Sandhurst, G.C.S.I., G.C.I.E., G.C.V.O.
The Earl of Meath, K.P.
E. Fraser.
The Lord Mostyn.
The Marquis of Breadalbane, K.G.
The Duke of Portland, K.G., G.C.V.O.
Lieut-Col. The Earl of Athlone, G.C.B., G.C.V.O., C.M.G., D.S.O.
Lieut.-Col. A. C. Yate.
Maj.-Gen. A. F. Terry.
The Earl of Plymouth, G.B.E., C.B. (Sub-Prior).
E. H. Freshfield.
Lieut.-Col. The Earl of Ellesmere, M.V.O. (Commander, Ellesmere Commandery).
Lieut.-Col. Sir Richard C. Temple, Bt., C.B., C.I.E.
Col. Sir Herbert Jekyll, K.C.M.G.
The Lord Islington, G.C.M.G., D.S.O.
Col. Sir J. R. A. Clark, Bt., C.B., C.M.G., F.R.C.S.ED.
Sir Robert Harvey.

KNIGHTS OF JUSTICE.—continued.

Col. The Lord Sydenham of Combe, G.C.S.I., G.C.M.G., G.C.I.E., G.B.E.
Lieut.-Col. J. W. Wray, C.B.E.
Sir William W. Portal, Bt.
The Duke of Somerset.
Sir Dyce Duckworth, Bt., M.D., F.R.C.P., LL.D.
Capt. Sir Harold E. Boulton, Bt., C.V.O., C.B.E.
The Marquis of Carisbrooke, G.C.V.O.
The Viscount Esher, G.C.B., G.C.V.O.
Lieut.-Col. The Lord Herbert Scott, C.M.G., D.S.O.
J. H. Stevenson, M.B.E.
F. W. Pixley.
Inspector-Gen. Belgrave Ninnis, C.V.O., M.D., R.N.
C. G. Kekewich.
His Excellency The Lord Chelmsford, G.C.S.I., G.C.I.E., G.C.M.G., G.B.E.
The Right Hon. Evelyn Cecil, M.P.
A. E. G. Rhodes, O.B.E.
The Earl of Derby, K.G., G.C.V.O., C.B.
Sir Owen Philipps, G.C.M.G., M.P.
The Right Hon. The Lord Claud Hamilton.
Lt.-Col. A. D. Acland.
The Hon. Sir Arthur Stanley, G.B.E., C.B., M.V.O.
Lieut.-Col. The Lord Monson.
Sir John P. Hewett, G.C.S.I., K.B.E., C.I.E.
The Earl Beauchamp, K.G., K.C.M.G.
Colonel E. D. Brown-Synge-Hutchinson, V.C., C.B.
The Earl of Donoughmore, K.P.
His Excellency The Duke of Devonshire, K.G., G.C.M.G., G.C.V.O.
His Excellency The Earl of Liverpool, G.C.M.G., G.B.E., M.V.O.

PRELATE: The Archbishop of York.

SUB-PRELATES:

The Bishop Ormsby.
The Bishop of Dunedin (Primate of New Zealand).
The Bishop of Oxford.
The Bishop of Gibraltar.
The Bishop Glyn.
The Bishop J. Taylor Smith.
The Bishop of Worcester.
The Bishop of St. David's.
The Bishop of Bombay.

OFFICIATING CHAPLAINS:

The Rev. Canon E. Sheppard, K.C.V.O., D.D.
The Bishop of Worcester.

KNIGHTS OF GRACE APPOINTED BY THE GRAND PRIOR:

Col. Sir John W. Ottley, K.C.I.E., R.E.
J. S. Griffiths, M.R.C.S.
Lt.-Col. George E. Twiss, C.M.G., F.R.C.S.I.
R. A. Gibbons, M.D.
J. H. Morgan, C.V.O., F.R.C.S.
Gen. Sir Henry M. Leslie Rundle, G.C.B., G.C.M.G., G.C.V.O., D.S.O.
Sir John C. Holder, Bt.
Surgeon-General Sir Richard Havelock Charles, G.C.V.O., M.D., I.M.S.
Capt. Alfred C. Seton-Christopher.

ESQUIRES APPOINTED BY THE GRAND PRIOR :

C. B. Hamilton, C.M.G.
E. Dawes.
Col. W. G. Carter, C.M.G.
Lieut.-Col. Sir Malcolm D. Murray, K.C.V.O., C.B.
Henry W. Fincham.

THE COUNCIL :

The Council consists of the Grand Prior, the Sub-Prior, the Executive Officers of the Order, the Commanders of existing Commanderies, and not more than fifteen members of the Grades of Knight of Justice, Chaplain, Knight of Grace and Esquire appointed by the Grand Prior.

MEMBERS APPOINTED BY THE GRAND PRIOR :

Major-Gen. J. C. Dalton.
Colonel The Lord William Cecil, C.V.O.
The Earl of Ranfurly, G.C.M.G.
Lieut.-Col. Sir Richard C. Temple, Bt., C.B., C.I.E.
Col. Sir James R. A. Clark, Bt. C.B., C.M.G., F.R.C.S.E.
Inspector-Gen. Belgrave Ninnis, C.V.O., M.D., R.N.
Sir Owen Philipps, G.C.M.G., M.P.
The Earl of Donoughmore, K.P.
Sir William H. Bennett, K.C.V.O., F.R.C.S.
The Lord Downham of Fulham.
The Hon. Sir William H. Goschen, K.B.E.
Sir Mackenzie D. Chalmers, K.C.B., C.S.I.
The Viscount Chilston.

FOR GENERAL INDEX SEE PAGE 220.
INDEX TO PRICE LIST, INSIDE BACK COVER.

The Grand Priory of The Order of the Hospital of St. John of Jerusalem in England.

AMBULANCE DEPARTMENT.

The St. John Ambulance Association.

PATRON:

HIS MAJESTY THE KING,
Sovereign Head and Patron of the Order.

PRESIDENT:

FIELD-MARSHAL H.R.H. THE DUKE OF CONNAUGHT, K.G.,
Grand Prior of the Order.

COMMITTEE:

Consisting exclusively of Members and Associates of the Order.

CHAIRMAN.—The Right Hon. The Earl of Donoughmore, K.P.
(Director of the Department).

DEPUTY CHAIRMAN.—Vacant.

EX-OFFICIO MEMBERS:

Col. Sir Herbert C. Perrott, Bt., C.H., C.B. (Bailiff of Egle).
The Secretary-General of the Order.
The Receiver-General of the Order.
The Chairman of the British Ophthalmic Hospital.

MEMBERS:

Major-General J. C. Dalton.
The Earl of Ranfurly, G.C.M.G.
Lieut.-Col. A C. Yate.
Col. Sir James R. A. Clark, Bt., C.B., C.M.G., F.R.C.S.ED.
Col. The Lord Sydenham, G.C.S.I., G.C.M.G., G.C.I.E., G.B.E.
Capt. Sir Harold E. Boulton, Bt., C.V.O., C.B.E.
Inspector-General B. Ninnis, C.V.O., M.D., R.N.
C. G. Kekewich.
V.C. Col. E. D. Brown-Synge-Hutchinson, C.B.
The Rev. T. C. Elsdon.
Major G. H. Darwin, M.D.
Col. G. S. Elliston, C.B., M.R.C.S.
Col. C. J. Trimble, C.B., C.M.G., L.R.C.P.ED.

CENTRAL EXECUTIVE COMMITTEE—*continued.*

Sir William H. Bennett, K.C.V.O., F.R.C.S.
S. W. Malkin.
C. Cotton, F.R.C.P.ED., M.R.C.S.
Lieut.-Col. C. B. Palmer, C.B.E., R.A.M.C. (V.)
Lieut.-Col. G. E. Twiss, C.M.G., F.R.C.S.I.
Major E. H. T. Parsons, C.B.E.
Brig.-General H. R. Mends, C.B.
Surg. Vice-Admiral Sir James Porter, K.C.B., K.C.M.G., M.D., LL.D., K.H.P., R.N.
J. A. Bloxam, F.R.C.S.
T. H. Woolston, C.B.E.
Col. C. R. Tyrrell, C.B., C.B.E., M.R.C.S.
Sir John Lumsden, K.B.E., M.D.
W. H. Winny, O.B.E.
F. N. Ellis.
A. W. Faire.
W. E. Audland, M.B.E., M.R.C.S.
Major A. H. Johnston, O.B.E., M.R.C.S., R.A.M.C. (V.)
J. M. Carvell, M.R.C.S., L.R.C.P.
E. A. Richards.
Captain C. A. Coventon, M.R.C.S., L.R.C.P., R.A.M.C.

CHIEF SECRETARY: Capt. A. N. Cahusac, M.C. (Acting).

ACCOUNTANT: W. R. Edwards, O.B.E.

DIRECTOR OF STORES: W. H. Morgan, O.B.E.

ASSISTANT SECRETARY: D. G. Monteith.

TERRITORIAL BRANCH.

CONTROLLER-IN-CHIEF:—Vacant.

SECRETARY: Major P. G. Darvil-Smith, C.B.E., R.A.M.C. (V.)

HEAD OFFICES:

St. John's Gate, Clerkenwell, London, E.C. 1.

BANKERS:

London County Westminster and Parrs' Bank Limited, Clerkenwell, E.C. 1.

SYLLABUS OF INSTRUCTION—ADULT COURSE.

First Lecture.

A. Outline and Principles of First Aid—Very important.
B. A brief Description of the Human Skeleton and of the Muscles.
C. Fractures—Causes, varieties, signs and symptoms.
D. Treatment of Fractures—General Rules.
E. The Triangular Bandage—Its application to the Head, Chest, Back, Shoulder, Elbow, Hand, Hip, Knee and Foot. Arm Slings (Large, Small and St. John).

Second Lecture.

A. Individual Fractures—Details of treatment:—The Skull, Lower Jaw, Shoulder-blade, Collar Bone, Arm, Forearm, Hand, Thigh, Leg, Knee-cap, Foot, Ribs, Pelvis and Spine.
B. Dislocations, Sprains, Strains—Signs, symptoms and treatment.
C. Practice—Treatment of Fractures.

Third Lecture.

A. General description of the Heart and Blood Vessels.
B. The Circulation of the Blood.
C. Varieties of Hæmorrhage.
D. Wounds accompanied by Arterial Hæmorrhage.
E. The situation of the main arteries—Pressure points.
F. Compression of arteries by Digital and Instrumental pressure.
G. Venous Hæmorrhage and Varicose Veins.
H. Practice—Compression of arteries.

Fourth Lecture.

A. Wounds accompanied by Venous or Capillary Hæmorrhage.
B. Poisoned Wounds.
C. Internal Hæmorrhage.
D. Hæmorrhage from special regions—Bruises.
E. Burns, Scalds, Frost-bite, Stings, Fish-hook in Skin, Embedded Needle.
F. Foreign bodies in the Eye, Nose or Ear.
G. Practice—Treatment of Fractures and Hæmorrhage (as in Lectures II. and III.).

Fifth Lecture.

A. The Nervous System.
B. The Organs and Mechanism of Respiration.
C. Insensibility
D. Practice—Artificial Respiration.

Sixth Lecture (for Males only).

A. Poisoning.
B. Improvised methods of lifting and carrying the sick or injured.
C. Hand Seats.
D. Stretcher exercise.

Sixth Lecture (for Females only).

A. Poisoning.
B. Hand Seats—Lifting and carrying of patients.
C. Preparation for the reception of accident cases.
D. Preparation of the bed.
E. Removing clothes.
F. Preparation for surgeon.

NOTE I.—The subject of poisons should be treated in a general manner; the common poisons classified, and only their general symptoms, effects and treatment taught.

NOTE II.—The latter part of each lecture should be devoted to practical work, such as the application of bandages and splints, lifting and carrying wounded on stretchers.

NOTE III.—Male classes must pass in that system of stretcher exercise most suitable for the locality.

NOTE IV.—When possible a skeleton should be used. Too much time should not, however, be spent on instruction in anatomical and physiological details. Lecturers and Examiners are particularly requested to remember that it is "First Aid" that has to be taught and tested, and not anatomy and physiology.

Mixed classes of men and women are on no account permitted.

SUMMARY OF CONTENTS.

Chapter I.

Page

Outline of First Aid—Very important 17
Questions on Chapter 28

Chapter II.

The Human Skeleton. Bones and Joints 29
Muscles. Voluntary and involuntary 39
Fractures and their treatment 40
Dislocations 68
Sprains 70
Sprains and Ruptured Muscles 71
Questions on Chapter 72

Chapter III.

Circulation of the Blood 76
Wounds and Hæmorrhage 80
Bites of Animals (Poisoned Wounds) 102
Internal Hæmorrhage 104
Hæmorrhage from the Nose 105
Hæmorrhage from the Mouth 106
Bruises 107
Questions on Chapter 108

Chapter IV.

Miscellaneous Injuries. Burns and scalds; stings of plants and animals; frost bite; trench foot; needle embedded under the skin; fish hook embedded in the skin; foreign body in the eye, ear passage and nose; wound in the front wall of the abdomen; injuries to the organs within the abdomen and pelvis; rupture... 111
Questions on Chapter 121

Chapter V.

	Page
The Nervous System. Cerebro-spinal, sympathetic ...	123
The Respiratory System	124
Insensibility...	127
Treatment in all Cases	128
Asphyxia	130
When Breathing is present and there are no Convulsions	141
Fits	147
Questions on Chapter	150

Chapter VI.

Poisoning. General rules for treatment ; special poisons	152
Questions on Chapter	159

Chapter VII.

The Triangular Bandage	160

Chapter VIII.

Methods of Carrying	165

Chapter IX.

The Sixth Lecture (for Females only). Preparation for reception of accident cases, choice and preparation of a room, lifting and carrying, preparation of bed, removing the clothes, preparations for surgeon..	200
Questions on Chapter	208

Appendix.

The Roller Bandage	210

LIST OF ILLUSTRATIONS.

	Page
Skeleton showing position of main arteries ...	*frontispiece*
The Ambulance Cross	23
Skull and vertebral column	31
Vertebra	31
Bones of the left upper limb	34
Bones of the right lower limb	36
Shoulder Joint	38
Ankle	38
Rectus Muscle	39
Triangular bandage spread out and folded	45
Large arm sling	46
Small arm sling	46
Reef knot	47
Granny knot	47
Loop knot	50
Bandage for fracture of lower jaw	51
Bandages for simple fracture of ribs	54
St. John sling	57
Bandage for fracture of shoulder blade	58
Treatment of fracture of arm	59
Angular splint	60
Treatment of fracture of forearm	61
Treatment of crushed hand	61
Treatment of fracture of thigh bone	63
Treatment of fracture of thigh bone (woman)	64
Fracture of knee cap	64
Treatment of fracture of knee cap	65
Treatment of fracture of leg (man and woman)	67
Treatment of crushed foot	68
Diagram of the heart, lungs and air passages	77
Diagram of the circulation of the blood	79

	Page
St. John Tourniquet	82
Digital pressure on carotid artery	88
Digital pressure on facial artery	88
Digital pressure on temporal artery	89
Digital pressure on occipital artery	89
Pad and bandage to arrest hæmorrhage from temple ...	90
Ring pad	91
Digital pressure on subclavian artery	91
Pad and bandages to apply pressure on axillary artery...	92
Digital pressure on brachial artery (two methods) ...	93
Flexion at elbow	94
Digital pressure on radial and ulnar arteries	94
Pad and bandage to arrest hæmorrhage from palm ...	96
Digital pressure on femoral artery...	97
Tourniquet on femoral artery	98
Flexion at knee	99
Organs of the chest and abdomen...	119
The lungs and bronchial tubes	126
Schäfer's method of artificial respiration	136
Vertical section of head	138
Silvester's method of artificial respiration	139
Triangular bandage for the head	160
Triangular bandage for the shoulder	161
Triangular bandage for the hip	161
Triangular bandage for the hand	162
Triangular bandage for the foot	162
Triangular bandage for the chest	163
Triangular bandage for the knee	164
Triangular bandage for the elbow	164
Lifting by two-handed seat...	165
Grip for two-handed seat	166
Carrying by two-handed seat	167
Grip for human stretcher	168
Carrying by human stretcher	169
Grip for three-handed seat	170

	Page
Grip for four-handed seat	171
Supporting patient	173
Fore and aft method of carrying	174
Carrying on improvised seat	175
Improvised stretcher	175
Furley stretchers	177
Stretcher exercise, No. I. "Stand to Stretcher" ...	179
Ditto, No. I. "Collect Wounded"	179
Ditto, No. I. "Lower Stretcher"	179
Ditto, ready to lift patient	181
Ditto, lifting patient...	182
Ditto, placing stretcher	183
Ditto, preparing to lower patient	184
Ditto, "March"	185
Ditto, changing numbers	187
Ditto, No. II. Ready to lift patient	189
Ditto, patient lifted	190
Ditto, changing numbers	192
Ditto, No. III. First position	194
Ditto, second position	195
Bed cradles	205 & 206
Roller bandage machine	210
Finger bandage	213
Spica for ball of thumb	214
Reverse spiral for the forearm	215
Spica for right groin	216
Spica for both groins	217
Knee bandage	217
Figure of 8 bandage for the leg	218
Many-Tail bandage	219

PREFACE.

At the request of the Ambulance Committee of the Order of St. John, we have undertaken the revision of the Official First Aid Hand-Book of the St. John Ambulance Association, written by Colonel Sir James Cantlie, K.B.E., F.R.C.S., in 1901, and subsequently revised by him.

Our aim has throughout been to simplify the study of First Aid. With this object in view we have extended the principle adopted by Sir James Cantlie of imparting information in the form of general rules for giving treatment correct in character and sufficient in extent, pending the arrival of professional help, without the complete investigation necessary to be made by a medical practitioner before he takes all the steps required in each individual case.

A short appendix on the use of the roller bandage, with typical illustrations, is included for the first time.

William R. Edwards (Chairman).
William E. Audland, M.R.C.S.
J. Maclean Carvell, M.R.C.S.
Charles Cotton, F.R.C.P.Edin.
Robert B. Duncan, M.D.
George S. Elliston, M.R.C.S.
Isaac G. Modlin, M.D.

August, 1917.

Chapter I.

OUTLINE OF FIRST AID.—VERY IMPORTANT.

The St. John Ambulance Association has now completed forty years of its existence, and during that period over a million men and women have been taught at its classes, in all parts of the world, how to help their injured neighbours.

What First Aid is.

First Aid to the Injured is a special branch of practical medicine and surgery, by a knowledge of which trained persons are enabled to afford skilled assistance in cases of accident and sudden illness. The instruction begins and ends with First Aid, and the subject is taught simply, but thoroughly and exhaustively. The duty of the ambulance pupil ends where the doctor's begins, and there ought to be no overlapping or clashing of duty or interests.

In First Aid to the Injured three things are essential:—

(*a*) To determine the nature of the case requiring attention, so far as is necessary for intelligent and efficient treatment. In other words, to make a sufficient diagnosis for the

purposes falling within the province of the First Aid student.

(*b*) To decide on the character and extent of the treatment to be given.

(*c*) Lastly, to apply the treatment most suited to the circumstances until professional help is available.

Everything that has any bearing on the case should be considered as follows :—

1. The Patient or Patients.—Difference in the sex may necessitate different lines of treatment. The position assumed by the patient, either voluntarily or by force of circumstances, should not escape attention. More than one patient may need assistance, and discrimination will be necessary to ensure that the most pressing needs of each receive prompt attention.

2. Signs, Symptoms and History.—By "signs" are meant any differences from the normal condition of the patient, such as pallor, congestion, swelling, dislocation, etc., which can be noted by the direct use of the senses—sight, touch, smell, hearing, and taste. (The sense of taste should very seldom, if ever, be used for this purpose.) "Symptoms" are the sensations of the patient such as pain, numbness, giddiness, hunger, etc., which he can, if conscious, describe; while "history," which may be obtained from the patient or from witnesses, means the circumstances such as a collision, fall, being subject to a

particular disease, etc., attending the accident or sudden illness. Symptoms are less reliable than signs, as one patient will try to make light of a very severe injury while another will make the most of a trifle, and history must be considered trustworthy in proportion to the reliability of the source whence it is obtained.

Symptoms *taken alone* are not of much value for diagnosis, but though as a rule unpleasant, they have their uses, as warnings of something wrong, as guides to the seat of mischief and, in many cases, by their abatement or increased severity, as indications whether the treatment given is right or wrong.

Symptoms when considered in conjunction with the history of the case, are distinctly enhanced in diagnostic value.

When to the above there is added information gained by the observation of definite signs, the diagnosis rests upon a solid basis.

3. The Cause or Causes.—When a cause is known, a conclusion, more or less accurate, may be drawn as to its probable effects. But it must be remembered :—

(*a*) That a cause may have more than one effect. For example, two or more injuries may result from one accident.

(*b*) That the effect or effects may be direct or indirect. For example, a blood-vessel may

break in the head, causing insensibility (direct effect). The patient will fall and a further injury may occur as the result of the fall, that is to say, indirectly as the result of the bursting of the blood-vessel.

(*c*) That the cause may be still active. For example, a foreign body in the throat will continue to impede breathing as long as it remains there.

4. **Surroundings.**—These will exercise a most important bearing on the first aid to be given, and therefore require careful consideration on the following lines :—

(*a*) **Possible sources of danger.**— Fire, moving machinery, electric wires, poisonous gases, a restive horse, slippery objects, etc., may be present and necessitate the protection not only of the patient but also of the first aider and of third parties.

(*b*) **Possible clues to diagnosis.**—A broken ladder. stains of blood, escaping gas, etc., may afford useful suggestions. Objects suspected of having some connection with the patient's injury or illness should, compatibly with the pressing needs of the emergency, be examined and perhaps preserved for future reference.

(*c*) **The help available** depends in the first

place on the presence or nearness of persons capable of helping, and in the second place upon the discrimination, explicitness and tact with which their efforts are directed. By the exercise of these qualities an inquisitive crowd may be so controlled and instructed as to be of vital assistance to the patient.

The importance of making satisfactory provision for professional assistance cannot be too strongly insisted on. For this reason, if in doubt, early enquiry as to the practicability of obtaining such assistance should be made. Discretion must be exercised as to sending for the doctor or taking the patient to him.

(*d*) **The appliances available.**—Appliances may be at hand in plenty, means of improvising may be adequate, or nothing but the actual resources of the patient and helpers may be available. The directions and illustrations which are given throughout this book are intended as a standard of treatment. It will frequently be impossible, for lack of appliances, to carry out the treatment exactly in the manner indicated. In such cases it will be necessary to comply with the principles of treatment in the best manner consistent with the actual circumstances.

(*e*) **The shelter.**—This word must be understood as including an extra wrap, or an umbrella, etc., as a temporary protection against the inclemency of the weather or fierce rays of the sun, as well as a shed, a private house, or a hospital. If the patient is to be taken to his home, a tactful message thereto might enable suitable preparation to be made, and in any case would be an act of kindness to those concerned.

(*f*) **Means of transport available.**—Considerations of the best means of transport to shelter involves questions of appliances, length of journey, the nature of the ground to be traversed, and the best disposal of the help available for carrying the patient and making arrangements for proper after care.

NECESSARY QUALIFICATIONS OF A FIRST AIDER.

In order to render the skilled assistance required the first aider should be—

(*a*) **Observant,** that he may note the causes and signs of injury.

(*b*) **Tactful,** that he may without thoughtless questions learn the symptoms and history of the case, and secure the confidence of the patient and bystanders.

(*c*) **Resourceful,** that he may use to the best

FIG. 1.—THE EIGHT-POINTED AMBULANCE CROSS.

advantage whatever is at hand to prevent further damage and to assist Nature's efforts to repair the mischief already done.

(*d*) **Dextrous,** that he may handle a patient without causing unnecessary pain, and use appliances efficiently and neatly.

(*e*) **Explicit,** that he may give clear instructions to the patient or the bystanders how best to assist him.

(*f*) **Discriminating,** that he may decide which of several injuries presses most for treatment by himself, what can best be left for the patient or the bystanders to do, and what should be left to the medical man.

(*g*) **Persevering,** that he may continue his efforts, though not at first successful.

(*h*) **Sympathetic,** that he may give real comfort and encouragement to the suffering.

Principles of First Aid.

1. **Death is not to be assumed because signs of life are absent.**—It frequently happens that even a medical man is unable to say positively whether a patient is alive or dead; far less can the First Aid student form a decision It is much better to treat a dead body than to allow a living person to die for want of First Aid.

2. **Remove the cause** of injury or danger whenever possible.

3. **Severe hæmorrhage must receive the first attention, no matter what are the other injuries.**

4. **Air.**—The patient must be in a position in which breathing is possible; the air passages must be free from obstruction; if breathing has ceased prompt measures must be taken to restore it.

5. **Rest.**—A restful position of the body will assist the vital functions. The position assumed by the patient should not be thoughtlessly altered. Support of the injured part will help to prevent further damage. The use of pillows in this connection is much to be commended.

6. **Warmth.**—After every accident keep the patient warm, so as to prevent the fall of temperature below the normal point (98·4 degrees Fahrenheit).

7. **When the skin is broken the wound should be promptly covered** with a clean absorbent dressing. Should the wound be poisoned, it is most important immediately to prevent the poison permeating the system.

8. **Poisons** swallowed should be got rid of, or when that is inexpedient, neutralised.

9. **The best means of transport** must be studied, and provision made for proper care when the patient is brought to shelter.

10. Removal of Clothing.—Clothes should not be taken off unnecessarily, but when it is needful to remove them, the following rules will be found of service in serious cases :—

COAT : Remove from the sound side first, and if necessary, slit up the seam of the sleeve on the injured side.

SHIRT AND VEST : Slit down the front and remove as the coat.

TROUSERS : Slit up the outer seam.

BOOT : Steady the ankle and undo the laces.

SOCK : Cut off.

11. Stimulants.—It is incorrect to suppose that alcohol is the only form of stimulant, and far too frequent use of spirits is made to restore a patient after an accident, often with serious results : the safest rule, therefore, is to defer the administration of alcohol until the arrival of a doctor. When the patient is able to swallow, strong tea or coffee, or milk as hot as can be drunk, or a tea-spoonful of sal volatile in half a tumbler of water may be given. Smelling salts may be held to the nose. Sprinkling the face with cold and hot water alternately, warmth applied to the pit of the stomach and over the heart, and vigorous friction of the limbs upwards have a stimulating effect.

12. Throughout his work the First Aid Student must on no account take upon

himself the duties and responsibilities of a Doctor.—At times an apparently slight injury is accompanied by grave danger and may actually cause loss of lite. When sending for a doctor, state the nature of the case, the whereabouts of the patient, and, if it is intended to move him at once, the destination and the route to be followed. Written particulars are safer than a verbal message.

Anatomy and Physiology.

It is necessary that something should be known of the structure of the body (anatomy), and of the functions of some of the more important organs and systems (physiology). A short description of the necessary anatomical and physiological points is therefore given as the several subjects are discussed. No matter what is the actual position of a person, for purposes of description the body is supposed to be erect, with the arms hanging by the side and the palms of the hands directed forwards. The "middle line" of the body runs vertically from the top of the head to a point between the feet.

QUESTIONS ON CHAPTER I.

The numerals indicate the pages where the answers may be found.

PAGE

What is First Aid to the injured?... 17
What are the three essentials of First Aid? 17, 18
How may the treatment differ according to the patient or patients? 18
Explain signs, symptoms and history 18
What is their value, separately or together? 19
What must you bear in mind in drawing conclusions from a known cause? 19, 20
State fully how the surroundings of the patient may influence First Aid 20–22
What qualifications should a First Aider possess? ... 22, 24
Is absence of signs of life proof of the presence of death? 24
What is often the first thing to do in an accident? ... 25
What result of injury must receive the first attention? ... 25
What three things are generally necessary for an injured person? 25
What should be done when the skin is broken?... ... 25
How should poisoning be treated? 25
What steps must be taken beyond the actual treatment of injuries? 25
How would you remove clothing when necessary from an injured person? 26
Explain the use and abuse of stimulants 26
What must the First Aider never do? 26, 27
What are anatomy and physiology? 27
When describing the body how is it supposed to be placed? 27
If a person raises his arm above his head, which is considered to be the upper part of that limb? (Answer: The shoulder) ... ...
What is the middle line of the body? 27

Chapter II.

THE SKELETON.

The human body is moulded upon a bony framework (the skeleton) which serves—

1.—To give shape and firmness to the body.

2.—To afford attachment to the muscles.

3.—To protect important organs, as in the skull, chest, and abdomen.

The Skull.

The Bones of the Skull are arranged in two groups, those of the brain case or cranium, and those of the face.

The Boundaries of the Cranium are the vault or dome, the rounded portion forming the top of the head; the front or brow; the back of the head, where the greatest extent of brain exists, and where therefore the cranium is widest and deepest; the sides or temples. The base of the skull is hidden from view by the bones of the face and of the vertebral column; in it are numerous perforations for the passage of blood vessels and nerves; through the largest opening the brain and spinal cord are continuous.

The Bones of the Face with the exception of

the lower jaw are firmly jointed together, so that movement between them is impossible. The cavities of the nose and of the eye sockets (orbits) are formed by the bones of the cranium and of the face conjointly. The mouth cavity is formed between the upper and lower jaws, the palate being the bony roof of the mouth which separates it from the nasal cavity above.

The Lower Jaw consists of:—

(*a*) A horizontal portion in which are the sockets for the teeth.

(*b*) Vertical portions terminating on either side at the joint between the lower jaw and the base of the skull situated immediately in front of the ear.

The angle of the jaw indicates the junction of the horizontal and the vertical portions.

The Back-bone, Spine, or Vertebral Column.

The Vertebral Column (Fig. 2A) is composed of bones called vertebræ, each of which consists of—

1.—A body or bony mass in front.

2.—Processes projecting backwards, which enclose a canal for the spinal cord—the spinal canal.

3.—Two transverse processes.

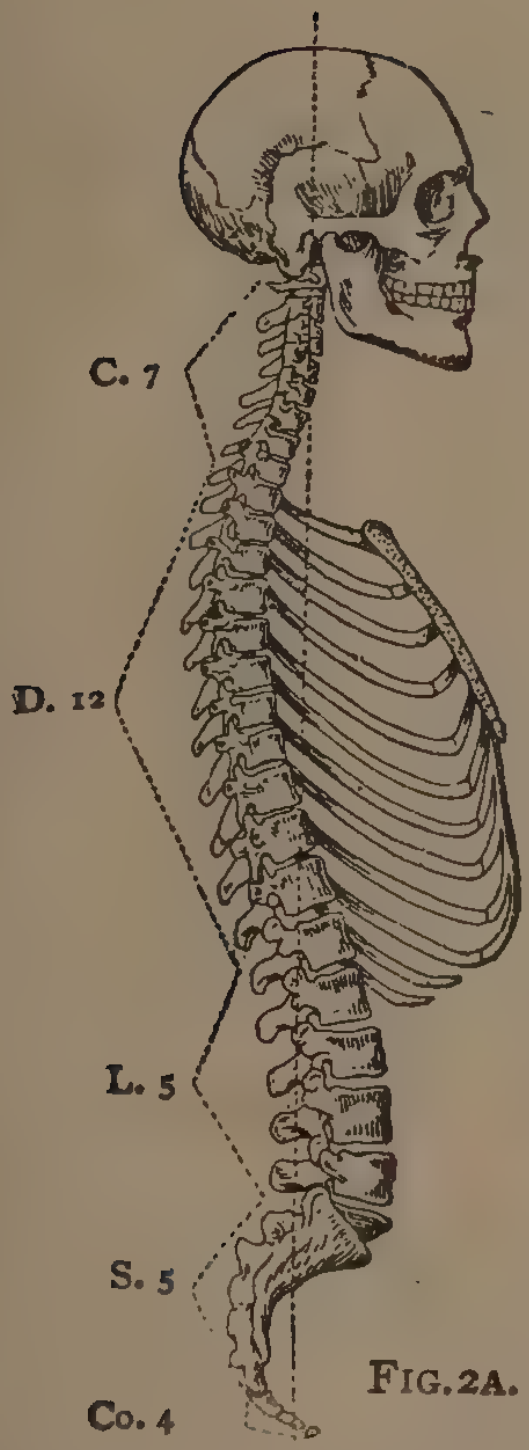


FIG. 2A.

SKULL AND VERTEBRAL COLUMN.

Showing left ribs and portion of breast bone. The right ribs are removed.

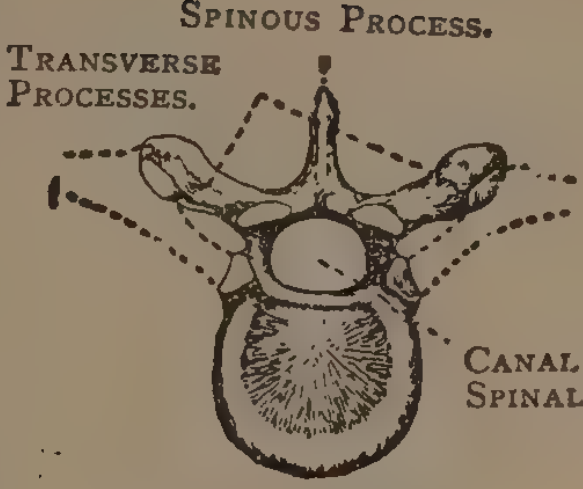


FIG. 2 B.

FIG. 2 C.

4.—A spinous process. The spinous processes of the vertebræ can be felt beneath the skin for the whole length of the back (Figs. 2B and 2C).

The Vertebræ, 33 in all, are grouped into regions, in each of which they are known by numbers, counting downwards :—

1.—In the neck 7 Cervical vertebræ. The first vertebra, *the atlas*, forms a joint with the base of the skull, at which the nodding movement of the head takes place; the second, *the axis*, by the joint between it and the atlas, allows of the side-to-side movements of the head.

2.—In the back 12 Dorsal vertebræ, to which the ribs are attached.

3.—In the loin 5 Lumbar vertebræ.

4.—The rump-bone, or Sacrum, consists of 5 Sacral vertebræ united in adults as a solid mass.

5.—The tail-bone, or Coccyx, consists of 4 vertebræ joined together to form a single group.

Between the bodies of the vertebræ, in the upper three regions, are interposed thick pieces of cartilage (gristle), which, while they bind the bones together, allow of free movement to the column as a whole, and help to break the shock of any sudden force applied to the spine (for example, when falling from

a height on the feet). The whole spine is strapped together by ligaments reaching its entire length.

The Ribs and Breast-bone.

The Ribs consist of twelve pairs of curved bones extending from the dorsal vertebræ to the front of the body, and are known by numbers—first, second, etc., commencing from above. The ribs are not bony throughout their entire length, but at a short distance from the front the bony material ends, and cartilage (gristle) takes its place. The upper seven pairs, called the true ribs, are attached by their cartilages to the **Breast-bone** (*sternum*), a dagger-shaped bone with the point downwards, just above the pit of the stomach. The lower five pairs of ribs are called "false." Of these the upper three pairs are attached by cartilage to the ribs immediately above them. The last two pairs are unattached in front and are called "floating." The ribs enclose the chest and serve to protect the lungs, heart, liver, stomach, spleen, etc.

The Upper Limbs.

The Shoulder-bones are the Collar-bone (*clavicle*) and the Shoulder-blade (*scapula*).

The Collar-bone can be felt on either side beneath the skin at the lower and front part of the neck as a narrow curved rod about the thickness of a finger. Its inner end rests on the upper part of the

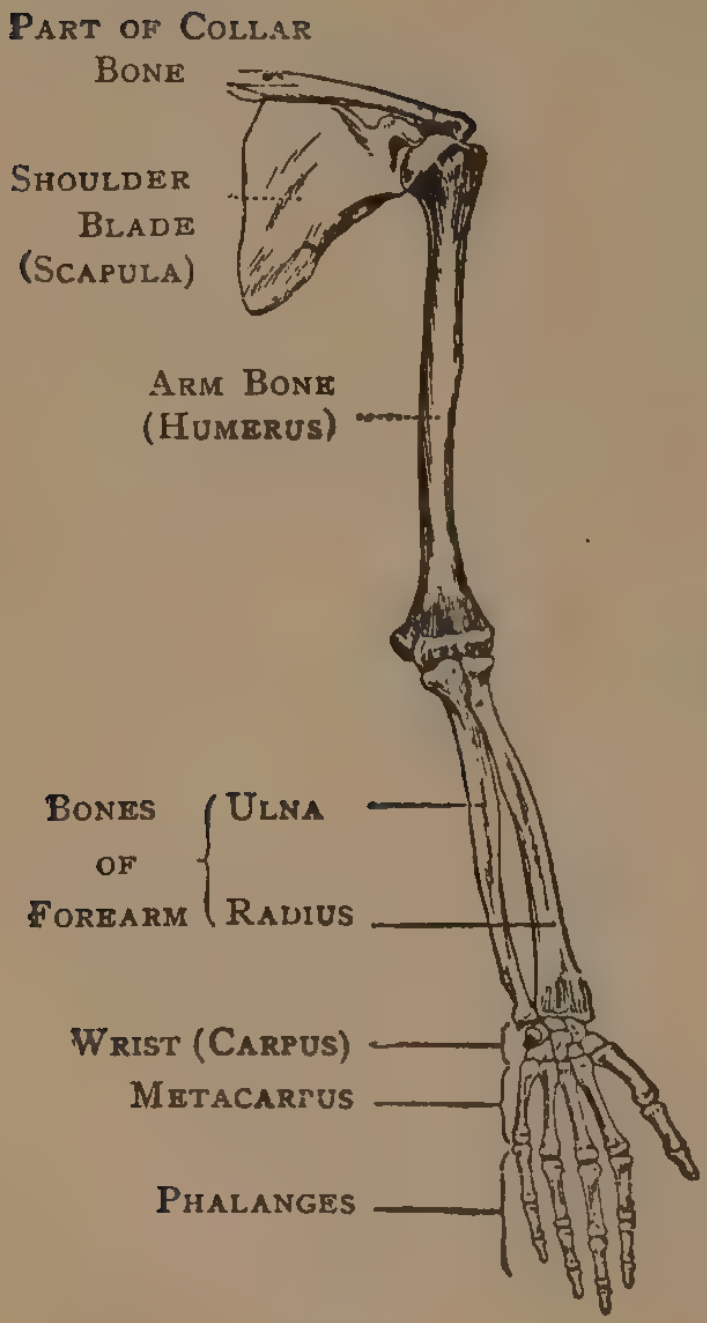


Fig. 3A.

Bones of the left Upper Limb.

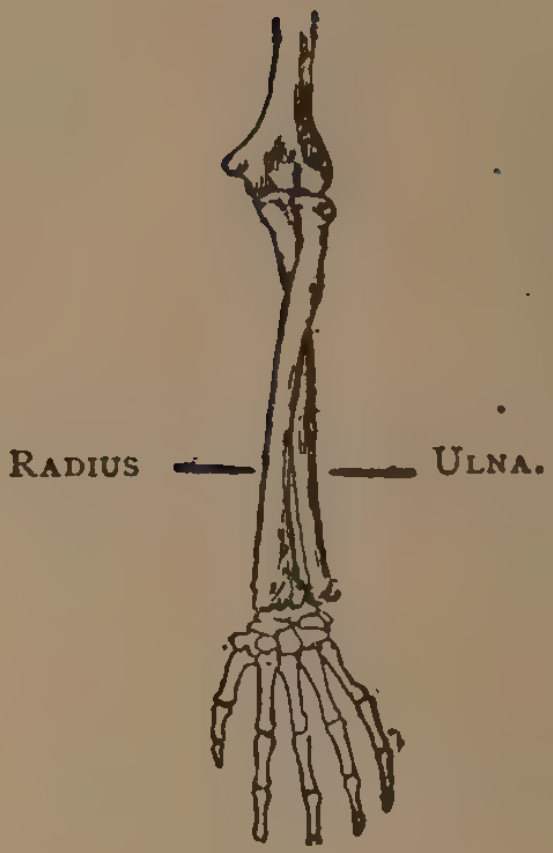


Fig. 3B.

Showing the position of the Radius and Ulna when the Thumb is turned inwards.

Compare Fig. 3A, in which the thumb is turned outwards.

breast-bone, and its outer end joins with the shoulder-blade.

The Shoulder-blade lies at the upper and outer part of the back of the chest, and forms joints with the collar-bone and the bone of the arm.

The bone of the Arm (*humerus*) reaches from the shoulder to the elbow.

In the **Forearm** are two bones, the *Radius* on the outer, or thumb side, and the *Ulna* on the inner, or little finger side. Both bones reach from the elbow to the wrist, and they change their relative position with every turn of the hand (Figs. 3A and 3B).

The **Hand** is composed of—

1.—The bones of the wrist, or *carpus*, eight in number, arranged in two rows of four.

2.—The *metacarpus* (the framework of the palm); five bones which form the knuckles and support the bones of the fingers.

3.—The *phalanges*, or finger-bones, three in each finger, and two in the thumb.

The Pelvis and Lower Limbs.

The **Pelvis.**—The large basin-like mass of bone attached to the lower part of the spine is composed of the two haunch-bones and the sacrum. The haunch-bones meet in front (at the *pubes*) in the middle line, only a small piece of cartilage intervening, but behind, the sacrum is placed between them. The pelvis

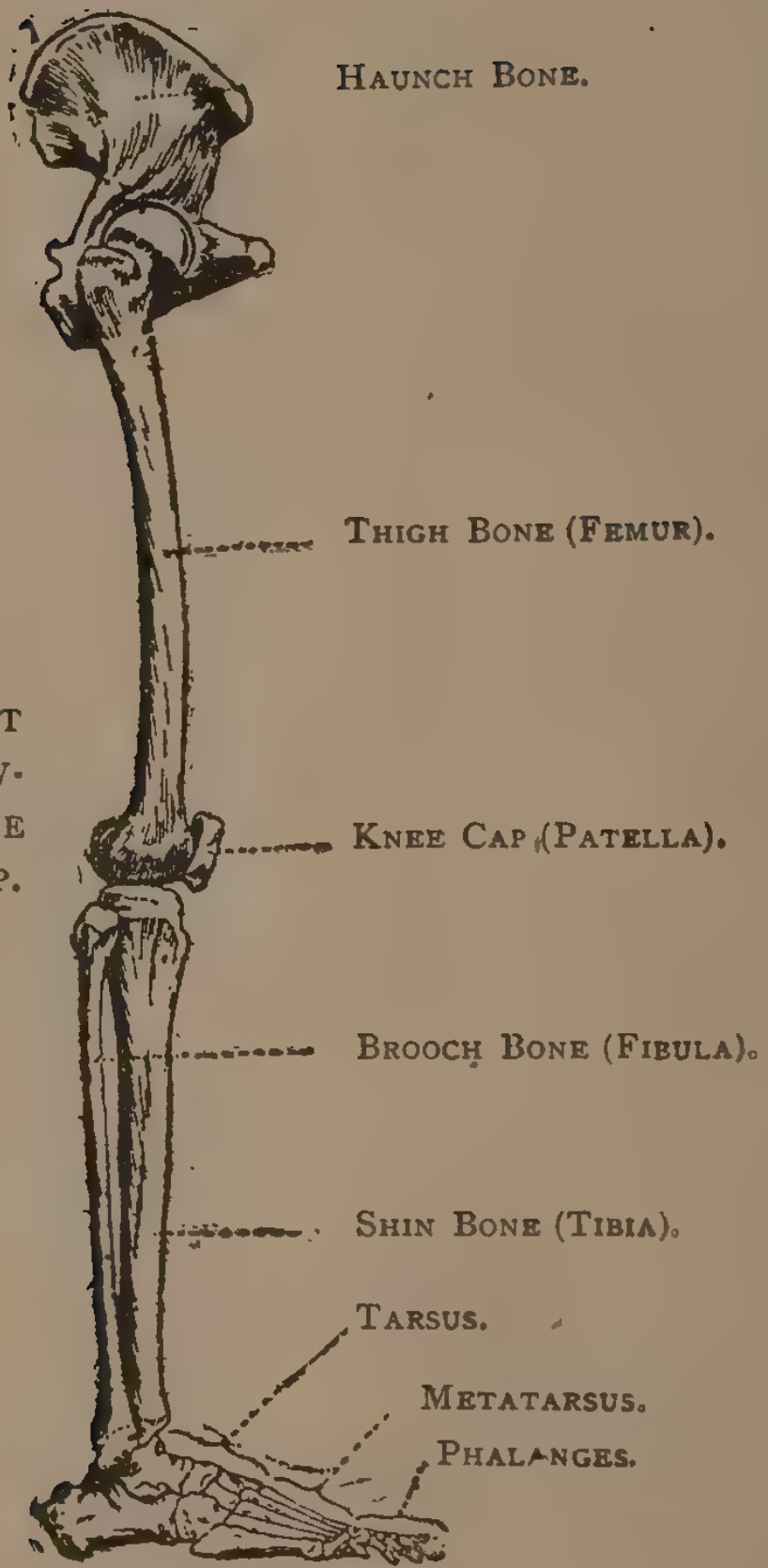


Fig. 4.

Bones of the right Lower Limb, showing Joint with the Pelvis at the Hip.

supports the abdomen and its contents, and provides the deep sockets for the thigh-bones—the hip joints.

The **Thigh-bone** (*femur*) reaches from the hip to the knee joint. Its shaft is stout, rounded, and arched forwards; the upper end presents a rounded head, supported on a neck which projects inwards, to fit into the socket of the hip joint.

The **Knee-cap** (*patella*) is a triangular bone lying with its base upwards in front of the knee joint immediately beneath the skin.

The **bones of the Leg** are the Shin-bone (*tibia*) and the Brooch-bone (*fibula*). The **Shin-bone** extends from the knee to the ankle, in both of which joints it plays an important part; its sharp edge, *the shin*, can be felt immediately beneath the skin of the front of the leg. The **Brooch-bone** lies on the outer side of the tibia. It does not enter into the formation of the knee joint, but its lower end forms the outer boundary of the ankle joint.

The **Foot** is composed of—

1.—The *tarsus*, a group of seven irregular bones at the instep. The largest is the heel-bone, and the uppermost (the ankle-bone) forms the lower part of the ankle joint.

2.—The *metatarsus*, the five long bones in front of the tarsus which support the toes.

3.—The *phalanges*, or toe-bones, two in the big toe, and three in each of the other toes.

JOINTS.

A **Joint** is formed at the junction of two or more bones. In moveable joints such as the hip, knee, elbow, etc., the surfaces of the bones are covered by cartilage, which lessens friction and the shock of a

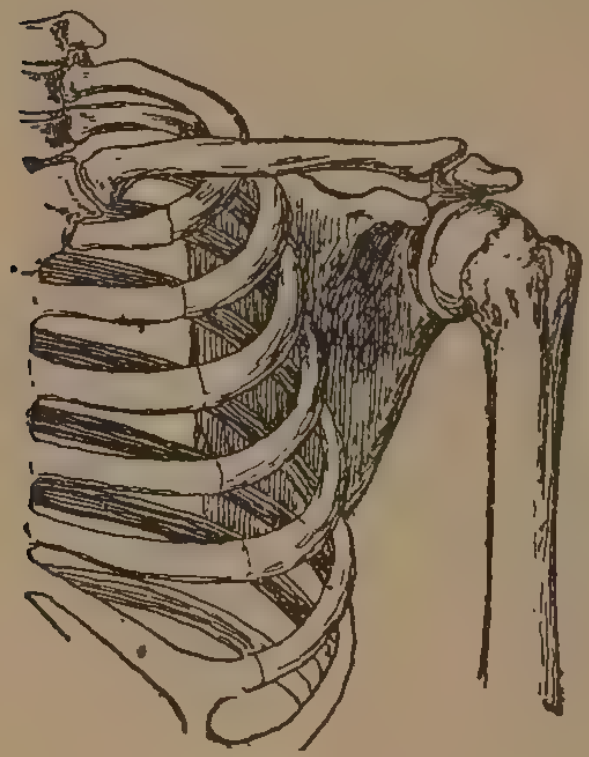


FIG. 5.

FIG. 6.

LEFT ANKLE.

Compare Fig. 4, Page 36.

fall. The *capsule* of the joint consists of bands of strong tissue surrounding the joint, braced with stronger bands called *ligaments*, and holding the two bones in position while allowing of free movement. It is lined with *synovial membrane*, whose function is to secrete fluid called *synovial fluid*, which is always inside the joint and acts as a lubricant.

To explain the varieties of moveable joints, the following examples are given :—

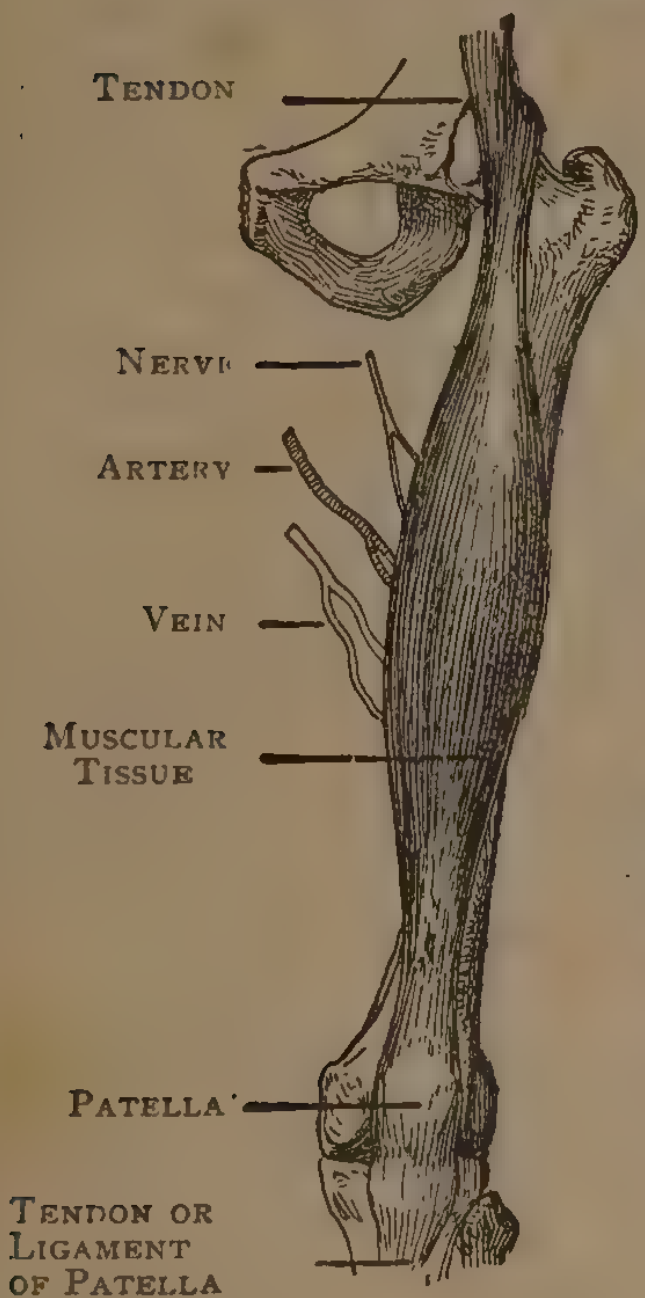


Fig. 7.

Diagram showing Rectus Muscle of Thigh, with Artery, Vein and Nerve.

The **Shoulder**, a ball-and-socket joint, consists of a shallow socket on the outer angle of the shoulder-blade, and of the head of the arm-bone (Fig. 5). Owing to the shallowness of the socket, which is necessary for free movement, the arm-bone is very prone to escape from its socket (dislocate).

The **Ankle**, a hinge joint, is formed at the junction of three bones, the shin-bone above and on the inner side, the brooch-bone on the outer side, and the ankle-bone below (Fig. 6).

THE MUSCLES.

The **Muscles** (red flesh) of the body are classified into two groups—*voluntary* and *involuntary*.

The **Voluntary Muscles** are met with in the limbs, the head and neck, and the surface of the trunk. Their ends are attached to different bones, and as they pass from one to another they cross a joint, and, being endowed with the power of contraction and relaxation, cause the movements of the body. As a muscle crosses a joint, it as a rule becomes a fibrous cord or *tendon*. Blood-vessels traverse and supply the muscles, and the nerves entering them bring them under the direct control of the brain and spinal cord.

The **Involuntary Muscles** are met with in the walls of the stomach and intestines, in the air passages, and in most of the internal organs and blood-vessels, also, in a special form, in the heart. They are not under the influence of the will, but continue their work during the hours of sleep; their functions are regulated by a separate set of nerves (see Sympathetic System, page 124).

FRACTURES AND THEIR TREATMENT.

When a bone breaks a Fracture is said to occur.

Causes of Fracture.

1. Direct Violence.—When from a severe blow, impact of a bullet, crush of a wheel, etc., a bone breaks at the spot where the force is applied, the fracture is termed direct.

2. Indirect Violence.—When the bone breaks at some distance from the spot where the force is applied, the fracture is termed indirect. Alighting on the feet and fracturing the thigh-bone or the bones of the leg, or falling on the hand and breaking the radius or the collar-bone, are examples.

3. Muscular Action. — The knee-cap and the arm-bone are occasionally broken by a violent contraction of the muscles attached to them.

Varieties of Fractures.

Fractures are classified **according to the condition of the tissues** adjacent to the bone as follows :—

1. Simple.—The bone is broken with but slight injury to the surrounding parts.

2. Compound.—The bone is broken and the skin and tissues are punctured or torn, thus allowing disease-producing germs to obtain entrance to the seat of fracture. The fractured ends may protrude through the skin, or (for example, when a bone is broken by a bullet) the wound may lead down to the fracture.

3. Complicated. — The bone is broken and in addition there is an injury to some internal organ (for example, the brain, spinal cord, lung, etc.) or to some important blood-vessel or nerve.

A fracture may be compound or complicated as the immediate result of the injury; or a fracture,

originally simple, may be converted into a compound or complicated fracture—

(*a*) By careless movement on the part of the patient.

(*b*) By carelessness or ignorance on the part of one rendering first aid.

Fractures are also classified **according to the injury to the bone itself.** The following varieties should be noted :—

1. **Comminuted.**—The bone is broken into several pieces, and therefore requires special care in handling.

2. **Green-stick.**—In children, owing to the softer state of the bony tissues, a bone may bend and crack without breaking completely across.

3. **Impacted.**—The broken ends of the bone are driven one into the other.

GENERAL SIGNS AND SYMPTOMS WHICH MAY BE PRESENT.

(A fracture of the bone of the thigh or arm, or both bones of the forearm or leg, affords the most complete example.)

1. **Pain** at or near the seat of fracture.

2. **Loss of power** in the limb.

3. **Swelling** about the seat of fracture. Swelling frequently renders it difficult to perceive other signs of fracture, and care must therefore be taken not to mistake a fracture for a less serious injury.

4. **Deformity** of the limb.—The limb assumes an

unnatural position, and is mis-shapen at the seat of fracture. The contracting muscles may cause the broken ends of the bone to override, thereby producing shortening.

5. **Irregularity** of the bone.—If the bone is close to the skin the fracture may be felt, and if compound it may be seen.

6. **Unnatural Mobility.**—Movement may be made out at the seat of fracture.

7. **Crepitus,** or bony grating, may be felt or heard when the broken ends move one upon the other.

The last two signs should only be sought by a doctor.

Several of the above signs are absent in green-stick and impacted fractures.

In addition to the signs and symptoms the patient or the bystanders may be able to give the history of the injury, and marks on the clothing or skin should be noted, as they may serve to locate the fracture. The snap of the bone may have been heard or felt.

APPARATUS FOR TREATMENT OF FRACTURES.

Splints and bandages have frequently to be used in the treatment of fractures, and it will often be found necessary to improvise them.

A Splint may be improvised from a walking stick, umbrella, billiard cue, broom or brush handle, policeman's truncheon, rifle, folded coat, piece of wood, cardboard, paper firmly folded, a rolled-up map, or, in fact, *anything that is firm and long enough to keep*

the joints immediately above and below the fractured bone at rest. When the above appliances are not available, the upper limb, if fractured, may be tied to the trunk, and in all cases a fractured lower limb should be bandaged to its fellow.

Bandages may be improvised from handkerchiefs, belts, straps, braces, neckties, or any piece of linen, calico, string or cord that comes to hand.

Triangular Bandages (Fig. 8) are made by cutting a piece of linen or calico about forty inches square diagonally into two pieces.

The broad bandage is made by bringing the point down to the base (Fig. 9), and then folding into two (Fig. 10).

The narrow bandage is made by folding the broad bandage once (Fig. 11).

The medium bandage is made by bringing the point down to the base, and then folding into three. (Fig. 12). This bandage may be used instead of the broad or the narrow bandage when it is better suited to the proportions of the patient.

It is sometimes advisable to halve the size of the bandage by bringing the two ends together before folding it into the broad, narrow, or medium bandage.

When not in use, the triangular bandage should be folded narrow; the two ends should be turned to the centre, and the bandage then folded into four, reducing it to a packet about $6\frac{1}{2}$ inches by $3\frac{1}{2}$ inches.

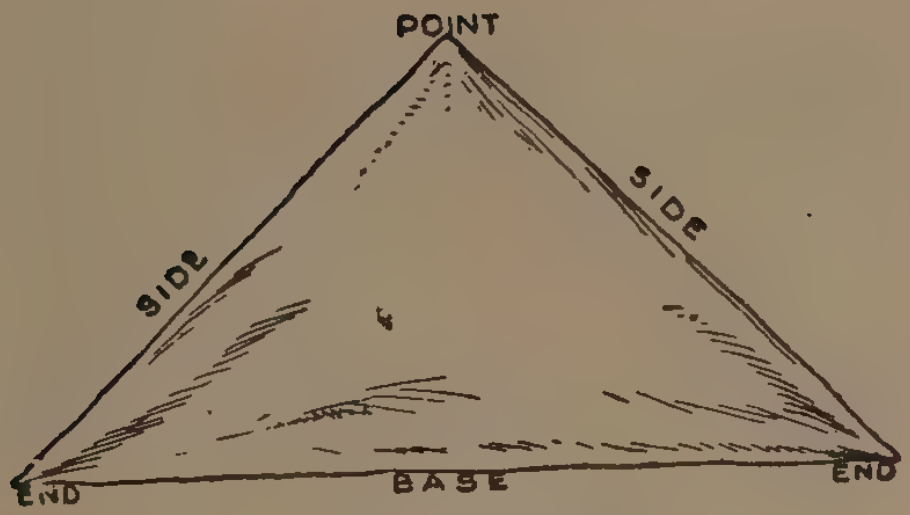


FIG. 8. BANDAGE SPREAD OUT.

FIG. 9. BANDAGE ONCE FOLDED.

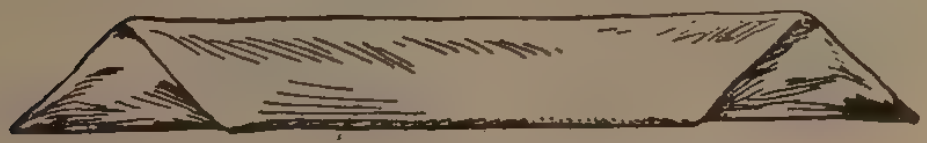


FIG. 10 BROAD BANDAGE.

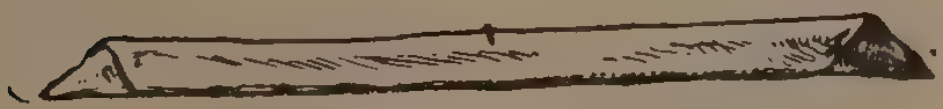


FIG. 11. NARROW BANDAGE.

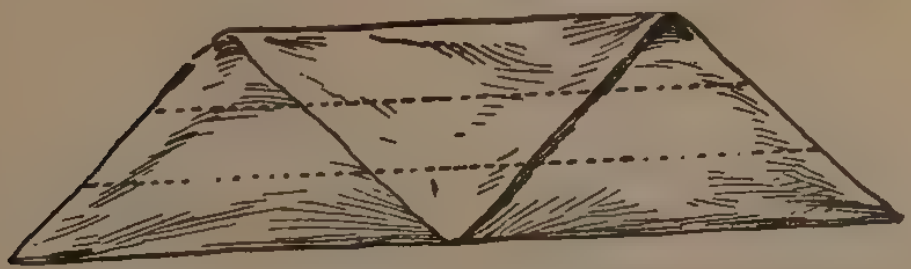


FIG. 12. THE DOTTED LINES SHOW THE FOLDS OF THE MEDIUM BANDAGE.

Large arm-sling (Fig. 13).—Spread out a triangular bandage, put one end over the shoulder on the sound side, pass it round the neck so that it appears over the shoulder of the injured side, and let the other end hang down in front of the chest; carry the point behind the elbow of the injured limb, and bend the

FIG. 13.

FIG. 14.

forearm over the middle of the bandage; then carry the second end up to the first and tie them; bring the point forward, and secure with two pins to the front of the bandage.

Small arm-sling (Fig. 14).—Place one end of a

broad bandage over the shoulder on the sound side, pass it round the neck so that it appears over the shoulder of the injured side; place the forearm over the middle of the bandage; then bring the second end up to the first, and tie them. This sling is used in cases of fractured humerus, and occasionally when the large sling would be too conspicuous.

Slings may be improvised in many simple ways, such

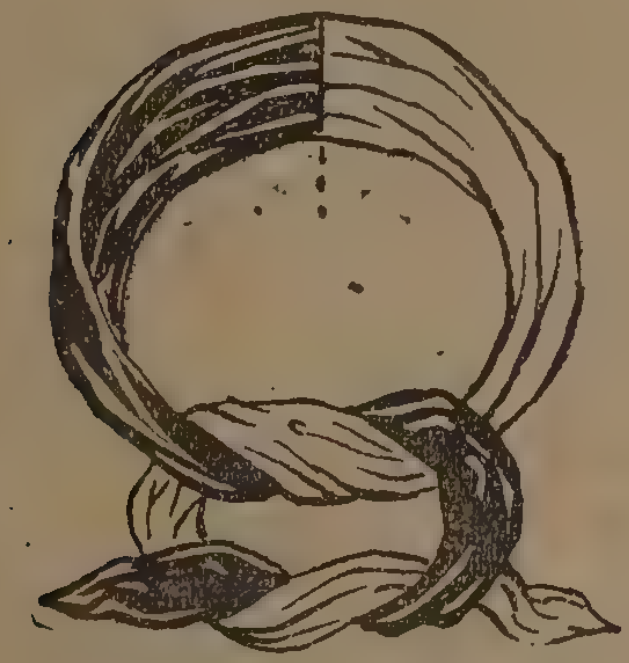


FIG. 15.—REEF KNOT.

FIG. 16.—GRANNY KNOT.

as pinning the sleeve to the clothing, turning up the tail of the coat, passing the hand inside the buttoned coat or waistcoat, etc.

Reef Knots (Fig. 15) are to be used. Avoid granny knots (Fig. 16).

General Rules for Treatment of Fractures.

The object of First Aid Treatment of Fractures is to guard against further mischief, and especially to prevent a simple fracture from becoming compound or complicated. To attain this end :—

1. **Attend to the fracture on the spot.** No matter how crowded the thoroughfare, or how short the distance to a more convenient or comfortable place, no attempt must be made to move the patient until the limb has been rendered as immovable as practicable by splints or other means of restraint.

2. **When hæmorrhage accompanies a fracture** it must be attended to first, and the wound covered by a clean dressing (see pages 84 and 85).

3. **Steady and support the injured limb** so that its further movement on the part of either the patient or the bystanders is prevented.

4. **Cover the patient** to keep him warm, and so lessen the effects of shock.

5. **With great care and without using force place the limb in as natural a position as possible,** and, if shortening is observed in the case of a fracture of a bone of the lower limb, pull upon the foot until the limb regains a more normal length. When the limb is straightened, on no account let go until it is secured in position by splints, otherwise there is great danger of the fracture becoming compound or complicated.

Do not attempt extension in the case of a compound fracture when the bone protrudes.

6. Apply splints (when practicable) and bandages as follows :—

(*a*) The splints must be firm, and long enough to keep the joints immediately above and below the fractured bone at rest. They should, if practicable, be padded to fit accurately to the limb and be applied over the clothing. Ample width is very desirable in a splint.

(*b*) The bandages must be applied firmly, but not so tightly as to constrict the circulation of blood in the limb. When the patient is in the recumbent position double the bandage over a splint to pass it under the trunk or lower limb. As a general rule :—

For the trunk the broad bandage should be used. Pass it once round the trunk and fasten it by tying the ends (or with two or three safety pins) on the side opposite to the fracture, but if to secure a splint for a broken thigh, tie or fasten the ends over the splint.

For the arm or forearm the narrow bandage should be used. Pass it twice round the limb, and tie the ends over the outer splint.

For the thigh or leg the narrow or medium bandage may be used. It is frequently

convenient to double the bandage at the centre, pass it under the limb, bring the loop over the limb, pass both ends of the bandage through it in opposite directions, and tie them over the outer splint (Fig. 17).

In applying bandages near a fracture the upper one should be secured first.

FIG. 17.

7. **Make no attempt to remove a patient suffering from a fracture of the spine, pelvis, or thigh, except in a recumbent position.**

8. **In all doubtful cases,** treat as a fracture.

SPECIAL FRACTURES.

Fracture of the Cranium.—A fracture of the upper part is usually caused by direct violence—for example, a blow on the head. A fracture of the base is caused by indirect violence, through a fall on the

head, a fall on the feet or lower part of the spine, or a severe blow on the lower jaw. *If the upper part is fractured*, the signs are swelling, irregularity, and frequently insensibility, either immediate or coming on gradually. *If the base is fractured* insensibility may come on immediately, blood or a clear fluid may issue from the ear channel, blood may escape from the nose, or it may pass down to the stomach, whence it may be vomited; the fracture may involve the orbit, causing a blood-shot eye.

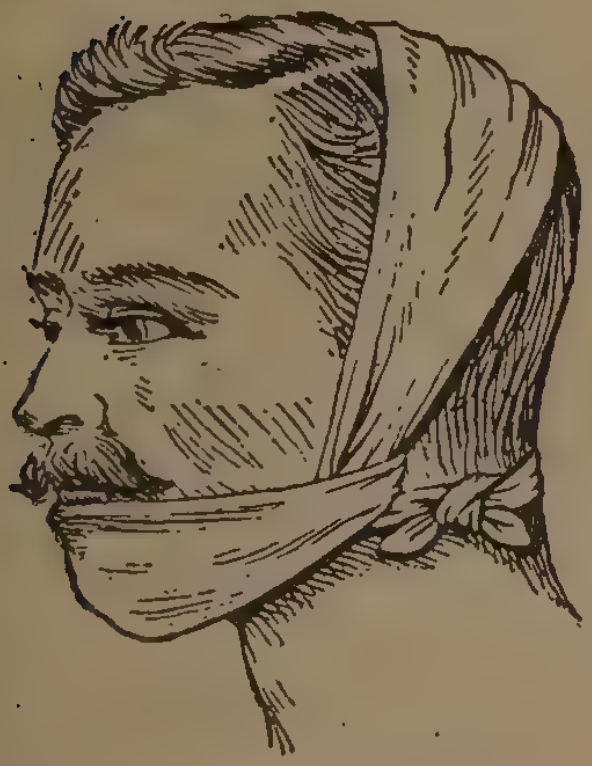


FIG. 18.

TREATMENT.

Injury to the brain is the great danger attending a fracture of the cranium. For treatment see "Concussion and Compression of the Brain," pages 142 to 146.

Fracture of the Lower Jaw.—Pain, loss of power (inability to speak and to move the jaw freely), irregularity of the teeth, crepitus and bleeding from the gum are the usual signs and symptoms.

Treatment.

1.—Place the palm of the hand below the injured bone and press it gently against the upper jaw.

2.—Apply the centre of a narrow bandage under the chin, carry one end over the head, cross the ends at the angle of the jaw, carry the long end across the chin, and tie the ends on the side (Fig. 18).

Fracture of the Spine.—The vertebral column may be broken either by direct or indirect violence. The fall of a heavy weight upon the back, and falling from a height on the back across a bar or upon an uneven surface are examples of direct violence, and a fall on the head, causing a broken neck, is an example of indirect violence. What is commonly regarded as a broken back consists of a fracture of one or more of the vertebræ with displacement of the fragments, whereby the spinal cord and the nerves issuing from it may be torn, causing complete or partial paralysis of the parts below the fracture. Pain is present at the seat of injury.

Treatment.

1.—Prevent all movement on the part of the patient.

2.—Cover the patient warmly.

3.—To remove the patient, place him on a stretcher or shutter as follows :—

(a) Turn up the collar of his coat; roll up a stick or umbrella in each side of the coat

so that the ends are level with the top of his head; pass a broad bandage or handkerchief under the head and secure it to the sticks. If no coat is worn, or doubt as to its strength and length exists, pass a number of bandages under the patient to serve instead of, or in addition to, the coat.

(b) A bearer on each side grasps the rolled coat with his hands well apart; a third grasps the clothing on both sides on a level with the hips; a fourth bearer takes charge of the legs.

(c) On the word being given, all lift together and carry the patient by short side paces over the stretcher and carefully lower him on to it. If a fifth bearer is available the stretcher should be passed under the patient instead of carrying him over it.

4.—On arrival at shelter nothing further is to be attempted until the arrival of a doctor, except to give the patient water, tea, etc., if he is conscious.

Fractured Ribs.—The ribs usually fractured are the sixth, seventh, eighth, or ninth, and generally the fracture is midway between the breast-bone and the spine. The fracture may be caused by indirect violence, driving the fractured ends of the bone outwards, or by direct violence, driving the fractured ends of the bone inwards and sometimes injuring the

lungs or other internal organ. If the lower ribs on the right side are broken, the liver may be injured, and a fracture of the lower left ribs may wound the spleen. Evidence of the fracture is afforded by pain, especially on attempting to take a deep breath, and by short and shallow breathing. If the lungs are injured blood, frothy and bright red, may be coughed up and expectorated. If the liver or spleen is wounded internal hæmorrhage may occur (see page 104).

FIG. 19.

TREATMENT.

(*a*) *When the fracture is not complicated by an injury to an internal organ* :—

1.—Apply two broad bandages round the chest sufficiently firmly to afford comfort, with the centre of the first immediately above and that of the second immediately below the fracture. The lower bandage should overlap the upper to half its

extent. The knots are to be tied rather to the front on the opposite side of the body. Another good plan is to apply a strong towel, folded about eight inches wide, tightly round the chest, securing it with three or four safety pins.

2.—Place the arm on the injured side in a large sling. (Fig. 19).

(*b*) *When an internal organ is injured*—

1.—Do not apply bandages round the chest.

2.—Lay the patient down, inclined a little towards the injured side.

3.—Loosen the clothing, give ice to suck, and place an ice bag over the seat of injury. Treat as for internal hæmorrhage (see page 104).

4.—Place the arm on the injured side in a large sling.

Fracture of the Breast-bone (*sternum*).—When this fracture can be felt or is suspected undo all tight clothing, and keep the patient quiet in an easy position until the arrival of a doctor.

Fracture of the Collar-bone (*clavicle*).—This fracture is frequently caused by a fall on the hand or shoulder.—The arm on the injured side is partially helpless, and the patient usually supports it at the elbow with his hand, and inclines his head towards the injured side. The fractured ends can generally

be felt to overlap, the outer fragment being the lower. The general signs and symptoms of fracture are mostly present.

TREATMENT.

1.—Remove the coat (see page 26), and as much more of the clothing as is expedient. Unfasten a man's brace on the injured side.

2.—Place a pad about two inches thick and four inches across in the armpit.

3.—Gently bend the forearm well up, keeping the shoulder as far back as practicable, and support it in a "St. John" sling, made as follows :—

(a) Lay an unfolded bandage across the chest over the injured limb with one end on the uninjured shoulder and the point beyond the elbow on the injured side. (Fig. 20).

(b) While steadying the injured limb pass the lower end of the bandage under it, across the back, and tie the ends somewhat loosely in the hollow *in front of* the sound shoulder.

(c) Fold the point over the elbow of the injured limb and secure it by one or two pins (Figs. 21 and 22).

4.—Tightly secure the injured limb to the side by a broad bandage passed round the elbow and trunk, so as to lever out the shoulder, the pad forming the fulcrum (Fig. 21). See that the pulse is present at

FIG. 20.

FIG. 21.

FIG. 22.
(Body bandage omitted to show details of Sling.)

the wrist; if it is not, relax the bandage around the body.

5.—Now tighten the sling.

Fracture of the Shoulder-blade (*scapula*).—Apply the centre of a broad bandage in the armpit of the injured side, cross the ends over the uninjured shoulder and tie them under the armpit (Fig. 23). Support the injured limb in a St. John sling.

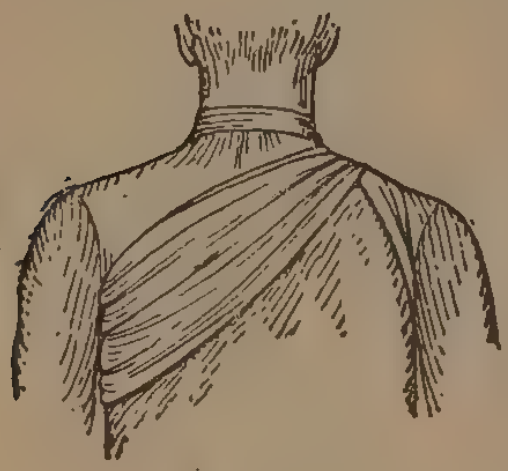


FIG. 23.

Fracture of the Arm (*humerus*). — The bone may be broken:—(*a*) Close up to the shoulder; (*b*) near the middle of the shaft; (*c*) close to the elbow.

All the general signs and symptoms of fracture are usually present.

TREATMENT.

When the Fracture is close to the Shoulder—

1.—Apply a broad bandage with its centre above the middle of the arm round the limb and body, tying it on the opposite side.

2.—Support the forearm by a small arm sling.

When the Fracture is near the Middle of the Shaft—

1.—Bend the forearm at a right angle to the arm.

2.—Apply splints, reaching from the shoulder to

the elbow on the outer and inner sides of the arm, and, if enough can be procured, to the front and back also. Note carefully that none of the splints press upon the blood-vessels in the armpit or elbow joint.

3.—Secure the splints by bandages above and below the fracture. If splints are not available, secure the arm to the side by two broad bandages.

4.—Support the forearm at the wrist by a small arm sling. (Fig. 24).

FIG. 24.

Fractures involving the elbow joint, whether of the arm or forearm, are attended with so much swelling, and it is so difficult to ascertain the exact nature of the injury, that when the accident occurs *indoors* the limb should be laid upon a pillow in the most comfortable position. Ice or cold water dressings should be applied to the injured part, but no further

treatment should be attempted pending the arrival of a doctor.

When the accident occurs out of doors—

1.—Take two pieces of thin flat wood, one long enough to reach from the armpit to below the elbow, the other long enough to reach from beyond the elbow to the finger tips; tie them together to form a right angle. (Fig. 25).

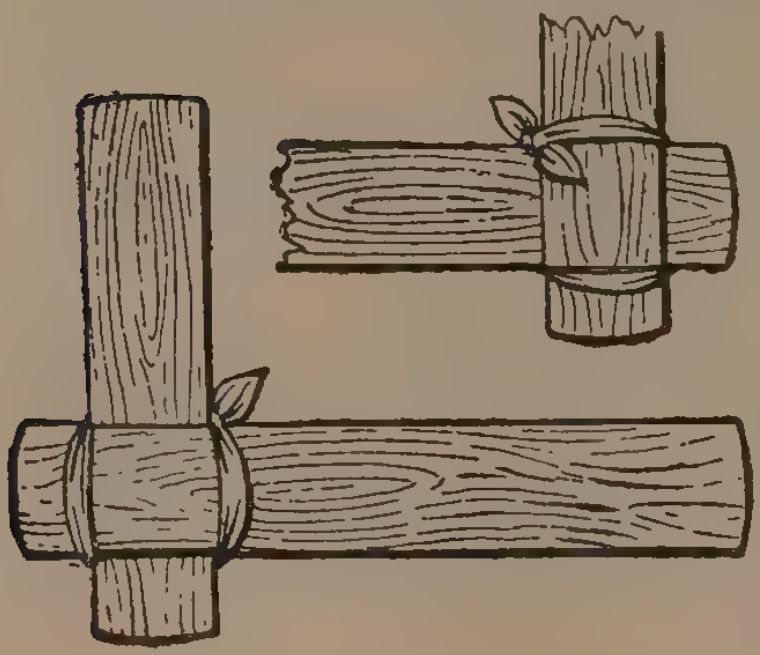


FIG. 25.

2.—Apply the angular splint so made on the side of the flexed limb that shows the least injury.

3.—Secure by bandages round the arm, the forearm and the hand.

4.—Support the limb by a large arm sling.

5.—On arrival at home remove the splint, and treat the injury as if it had occurred indoors.

Fracture of the Forearm.—When both bones (the Radius and Ulna) are broken, the general signs and symptoms of fracture are usually present. When one of the bones only is broken the signs and symp-

toms are as a rule pain, loss of power, swelling, and irregularity. An impacted fracture of the Radius just above the wrist is a common result of a fall on the hand.

TREATMENT.

This is the same, whether the fracture is of one bone or of both.

1.—Bend the forearm at right angles to the arm,

FIG. 26.

FIG. 27.

keeping the thumb upwards, and the palm of the hand towards the body.

2.—Apply broad splints on the inner and outer sides from the elbow to the fingers.

3.—Apply bandages, embracing both splints, immediately above and below the fracture and round the hand (Fig. 26).

4.—Apply a large arm-sling.

Crushed Hand (fracture of the bones of the carpus, metacarpus, or fingers).

TREATMENT.

1.—Apply a carefully padded splint to the front of

the hand, reaching from well above the wrist to beyond the tips of the fingers.

2.—To secure the splint apply a narrow bandage crossed in the manner of the figure 8 to the wrist and hand (Fig. 27).

3.—Apply a large arm-sling.

Fracture of the Pelvis.—When, after a severe injury in the neighbourhood of the haunch-bone, there is no sign of damage to the lower limbs, but the patient is unable to stand or even to move the lower limbs without great difficulty and pain, a fracture of the pelvis may be assumed to have occurred. The blood-vessels and organs, especially the bladder, within the pelvis are in danger of being wounded.

TREATMENT.

1.—Lay the patient in whatever position is found to give the greatest ease, and flex or straighten the lower limbs as the patient desires.

2.—Apply a broad bandage round the hips tight enough to support the parts, but not so tight as to press the broken bone further inwards.

3.—To remove the patient place him on a stretcher, acting on the same principle as that described under "Fracture of the Spine" (see pages 52 and 53).

Fracture of the Thigh-bone (*femur*).—The thigh-bone may be broken at its neck, anywhere in the shaft, or close to the knee. A fracture at the

neck is likely to occur in old people from very slight injury, and is often difficult to distinguish from a severe bruise of the hip, but it may be assumed that when, after an injury near the hip joint, the patient cannot, when lying on the back, raise the heel from the ground, the bone is broken. All the general signs and symptoms of fracture are usually present and a prominent sign is the position of the foot,

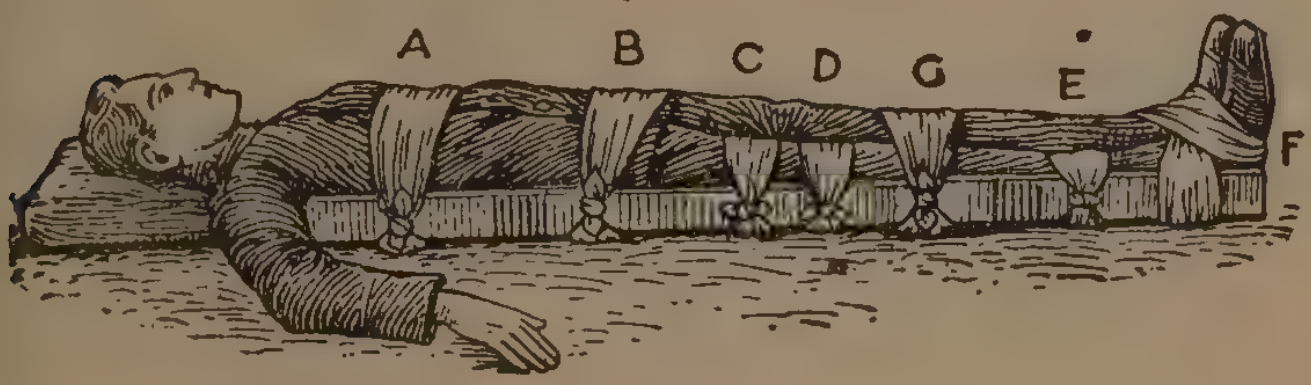


FIG. 28.

which, as a rule, lies on its outer side. Shortening may vary from one-half to three inches.

TREATMENT.

1.—Steady the limb by holding the ankle and foot.

2.—Gently draw down the foot and bring it into line with its fellow. When two or three assistants are at hand, it is one person's duty to hold the foot in position until the splints are secured.

3.—Apply a splint on the outer side from the armpit to beyond the foot.

4.—Apply a splint on the inner side from the top of the thigh (the fork) to just above the knee.

5.—Secure the splints by bandages as follows:—(*a*) Round the chest just below the armpits, (*b*) round the pelvis on a level with the hip joints, (*c*) above the fracture, (*d*) below the fracture, (*e*) round the leg, (*f*) round both ankles and feet, and tied below the feet, (*g*) a broad bandage round both knees (Fig. 28).

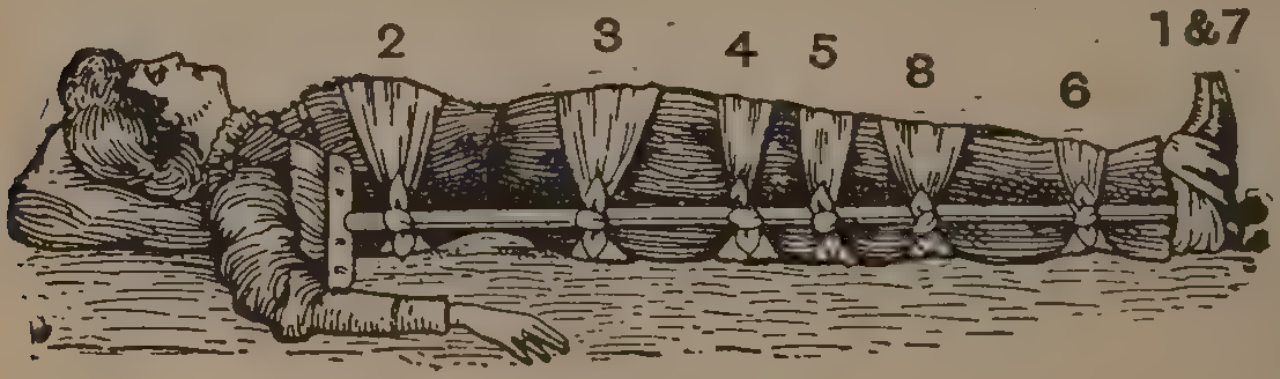


FIG. 29.

FIG. 30.

When single-handed, or when the patient is a woman, it is expedient, after extension of the limb, to tie the feet together, dispense with the inner splint, and pass the bandages round both limbs in the order shown by numbers in Fig. 29.

Fracture of the Knee-cap (*patella*).—The knee-cap may be broken by direct violence, but more frequently it is broken by muscular action, as follows:—

When the foot slips, in the attempt to prevent a fall the muscles in the front of the thigh act with such force as to snap the knee-cap in two (Fig. 30).

Pain, loss of power (the limb will be quite helpless), and irregularity (a gap may be felt between the broken fragments of bone) accompany this injury.

Treatment.

1.—Lay the patient on his back, raise well and

Fig. 31.

support the head and shoulders, straighten and raise the limb.

2.—Apply a splint along the back of the limb, reaching from the buttock to the heel.

3.—Apply a narrow bandage with its centre immediately above the knee-cap, cross the ends behind

over the splint, pass them again to the front of the limb just below the knee-cap and tie them. To ensure firmness apply a second bandage in a similar way, but commenced below and tied above the broken bone.

4.—Further secure the splint by bandages round the thigh and leg.

5.—Support the foot well off the ground by a pillow, roll of clothing, two bricks, etc. (Fig. 31).

6.—Apply cold (ice or cold water) dressings over the fracture to lessen effusion of blood.

Fracture of the Leg (*tibia and fibula*).—One or both of the bones may be broken. When both bones are broken all the general signs of fracture are usually present, but when one bone only is broken deformity is not always noticeable. A fracture of the fibula three or four inches above its lower end is frequently mistaken for a sprain and sometimes for a dislocation of the ankle.

TREATMENT.

1.—Steady the limb by holding the ankle and foot.

2.—Draw the foot into its natural position, and do not let go until the splints have been fixed.

3.—Apply splints on the outer and inner sides of the leg, reaching from above the knee to beyond the

foot. If only one splint is available place it on the outer side.

4.—Secure the splints by bandages (*a*) above, (*b*) below the fracture, (*c*) immediately above the knee,

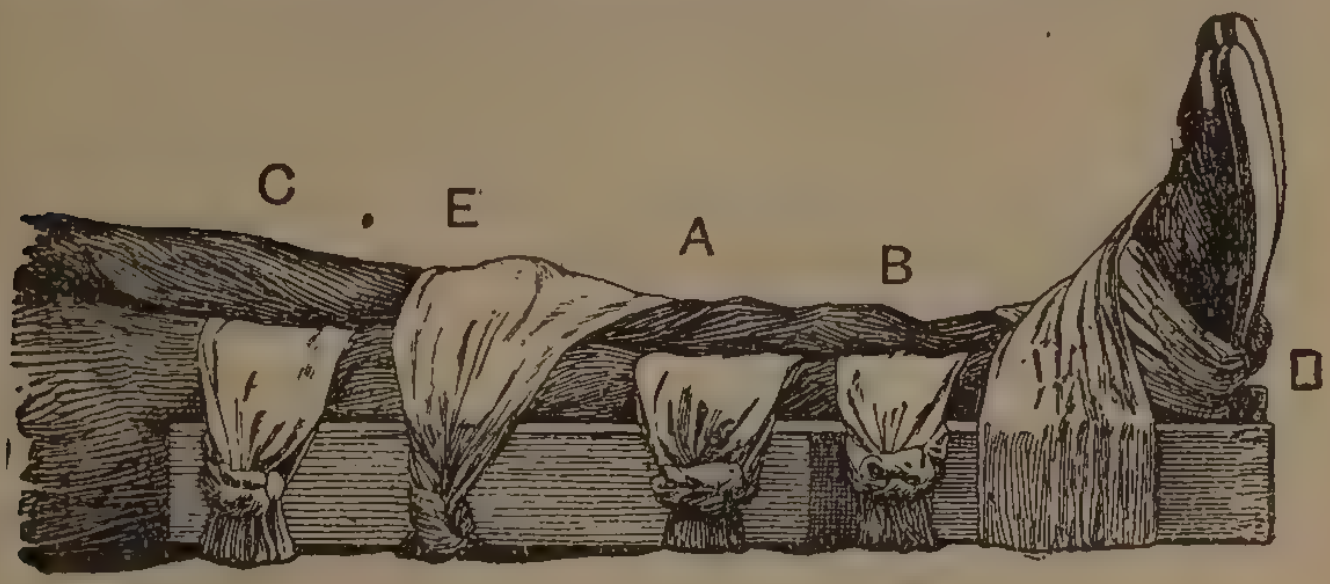


FIG. 32.

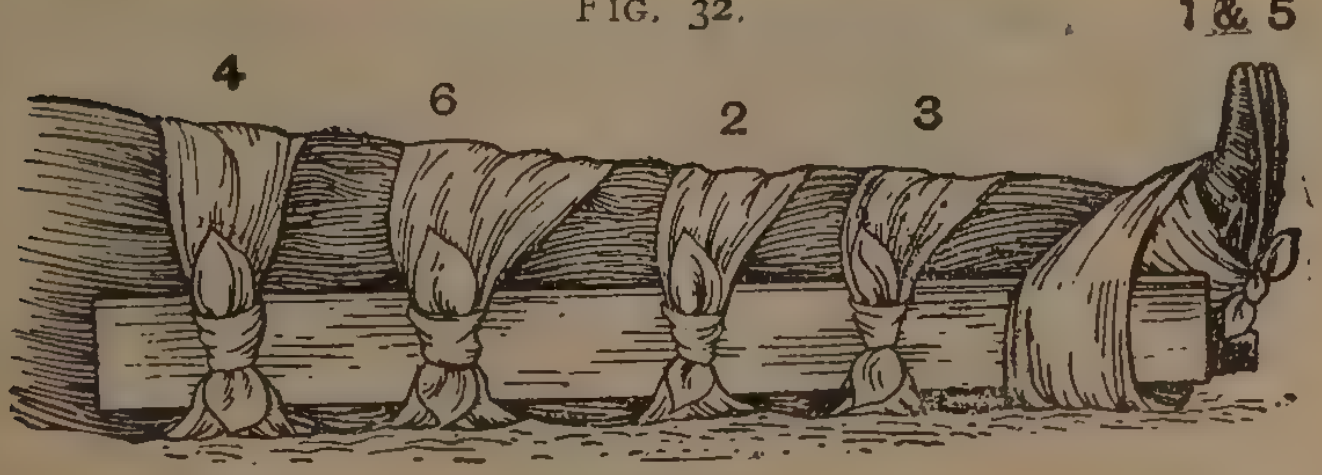


FIG. 33.

(*d*) round both ankles, (*e*) a broad bandage round both knees (Fig. 32).

When single-handed, or when the patient is a woman,

after extending the limb tie both feet together, dispense with the inner splint, and pass the bandages round both limbs in the order shown by numbers on Fig. 33.

When no splint is available tying the legs, ankles, and knees together is of great service.

Crushed Foot (fracture of the tarsus, metatarsus and toes).—This accident is commonly caused by the passage of a heavy weight over the foot, and may be recognised by pain, swelling, and loss of power.

TREATMENT.

FIG. 34.

1.—Remove the boot (see page 25).

2.—Apply a well-padded splint to the sole of the foot, reaching from the heel to the toes.

3.—The centre of the bandage being placed over the instep, apply it crossed after the manner of the figure 8 (Fig. 34).

4.—Support the foot in a slightly raised position.

DISLOCATIONS.

A dislocation is the displacement of one or more of the bones at a joint.

The joints most frequently dislocated are those of the shoulder, elbow, thumb, fingers, and lower jaw.

Signs and Symptoms.

1.—**Pain** of a severe sickening character at or near the joint.

2.—**Loss of power** in the limb.

3.—**Numbness** of the parts below the seat of dislocation.

4.—**Swelling** about the joint.

5.—**Fixity** of the joint.—The limb cannot be moved at the joint by either the patient or others.

6.—**Deformity** of the limb.—The limb assumes an unnatural position, and is mis-shapen at the joint.

Treatment.

No attempt should be made by anyone except a doctor to reduce a dislocation. Pending his arrival :—

(*a*) *When the accident occurs out of doors*—

Support the limb in whatever position gives most ease to the patient, bearing in mind the necessity of lessening the effects of jolting during transport.

(*b*) *When the patient is indoors*—

1.—Remove the clothing from the limb.

2.—Place the patient on a couch or bed.

3.—Rest the limb on pillows in the most comfortable position.

4.—Apply cold (ice or cold water) dressings to the joint.

5.—When cold ceases to give comfort apply

warmth (flannels or towels wrung out of hot water).

6.—Treat shock (see pages 141 to 144).

SPRAINS.

When, by a sudden wrench or twist, the ligaments and the parts around a joint are stretched and torn the joint is said to be sprained. "Going over" the ankle is a common example.

Signs and Symptoms.

1.—Pain at the joint after a twist or wrench.
2.—Inability to use the joint.
3.—Swelling and discoloration.

Treatment of Sprained Ankle.

When out of doors—

1.—Apply a bandage tightly over the boot, placing its centre on the sole at the instep, crossing it on the front of the ankle, and carrying it round and round the ankle, where it is to be firmly tied.

2.—Wet the bandage after application; it is thereby tightened.

After reaching shelter—

1.—Remove the boot and stocking (see page 26).

2.—Place the limb in the most comfortable position (usually well raised).

3.—Apply cold (ice or cold water) dressings to the joint as long as they relieve pain.

4.—When cold fails to give comfort, apply hot fomentations.

When other joints are sprained, treat them as if dislocated.

When in doubt as to the nature of the injury, treat as a fracture.

STRAINS AND RUPTURED MUSCLES.

When, during severe exertion, muscles or tendons are over-stretched they are said to be strained, if they are actually torn they are described as ruptured.

Signs and Symptoms.

1.—A sudden sharp pain.

2.—When the muscles of a limb are strained they may swell and cause severe cramp.

3.—Further exertion is difficult or impossible; for example, if the strain has occurred in the back the patient may be unable to stand upright.

Treatment.

1.—Place the patient in the most comfortable position, and afford support to the injured part.

2.—Apply hot water bottles or fomentations when the pain is very severe.

A so-called strain in the groin (hernia) is an injury of a totally different nature (see page 121).

QUESTIONS ON CHAPTER II.

The numerals indicate the pages where the answers may be found.

	PAGE
What is the skeleton, and what purposes are served by it?	29
How are the bones of the skull arranged?	29
What are the boundaries of the cranium?	29
Describe the bones of the face	29, 30
Describe the lower jaw	30
What is the angle of the jaw?	30
What other names has the back-bone?	30
Describe a vertebra	30–32
How many vertebræ are there in the spine?	32
What are the regions of the spine, and how many vertebræ are there in each?	32
How is the spine endowed with free movement? ...	32
What is a rib?	33
How many pairs of ribs are there and how are they named?	33
What is the breast-bone?	33
What are the bones of the upper limbs?	33–35
What is the pelvis?	35
What is the hip joint?	37
What are the bones of the lower limbs?	37
What is a joint?	38
Describe a moveable joint	38
Describe the shoulder joint	39
Describe the ankle joint	39
How are muscles classified?	39
Describe voluntary muscles	40
What are involuntary muscles and where are they found?	40
What is a fracture?	40
What are the causes of fracture?	40, 41

PAGE

Where does a bone break when direct violence is the cause of fracture? 40
Where does a bone break when indirect violence is the cause of fracture? 41
How may a fracture be caused by muscular action? ... 41
In what two ways may fractures be classified? 41, 42
What is a simple fracture?... 41
What is a compound fracture? 41
What is a complicated fracture? 41
What is a comminuted fracture? 42
What is a green-stick fracture? 42
What is an impacted fracture? 42
State the general signs and symptoms that may be present in a case of fracture 42, 43
What fractures afford the most complete example of the signs and symptoms? 42
In making up your mind whether a fracture had occurred or not, what points should you take into consideration beyond the signs and symptoms? 43
What apparatus may be necessary for the treatment of fractures? 43, 44
How may splints be improvised? 43
How may bandages be improvised? 44
Describe the triangular bandage 44
In what ways may the triangular bandage be folded for use? 44
How many kinds of arm-slings are there, and what are they called? 46, 56
What knot is to be tied, and what knot avoided? ... 47
What is the object of first aid treatment of fractures? 48
Give the general rules for the treatment of fractures ... 48–50
How should splints be applied? 49
How should bandages be applied? 49
What may cause a fracture of the upper part of the cranium? 50

PAGE

What may cause a fracture of the base of the cranium? 50
What are the signs of fracture of the upper part of the cranium? 51
What are the signs of fracture of the base of the cranium? 51
What is the treatment for fracture of the cranium? ... 51
What are the signs and symptoms of fracture of the lower jaw? 51
How may a fracture of the spine be caused? 52
What is commonly regarded as a broken back? 52
What are the signs and symptoms of a fractured spine? ... 52
How may ribs be fractured? 53
How may a fracture of ribs be complicated? 53
State the signs and symptoms of a simple and of a complicated fracture of the ribs 54
What is a frequent cause of fractured collar-bone? ... 55
What are the signs and symptoms of fractured collar-bone? 55
At what points may the bone of the arm be broken? ... 58
Are the general signs and symptoms of a fracture always present in a broken forearm? 60, 61
State the cause of a common fracture of the radius ... 61
How would you recognise a fracture of the pelvis? ... 62
At what points may the thigh-bone be broken? 62
What are the signs and symptoms of fracture of the thigh-bone? 63
What are the causes of fracture of the knee-cap? ... 64, 65
What are the signs and symptoms of fracture of the knee-cap? 65
Are the general signs and symptoms always present in a fracture of the leg? 66
What mistake may easily be made when the fibula is broken near its lower end? 66
What is a dislocation? 68
State the signs and symptoms of dislocation 69

PAGE

State the treatment of dislocation... ... ...69, 70
What is a sprain? 70
What are the signs and symptoms of a sprain? 70
State the treatment of a sprained ankle 70, 71
State the treatment of other sprains 71
When not sure whether the injury is a sprain or fracture how would you treat it? 71
How may muscles be strained or ruptured? 71
State the signs and symptoms of strains 71
State the treatment of strains 71

First Aid Students should practise improvising material, folding bandages, tying knots, making slings, and the treatment of the following injuries.

Improvising splints 43
Improvising bandages 44
Folding bandages 44
Large arm sling 46
Small arm sling 46, 47
Reef knots 47
Knot for applying splint to lower limb 49, 50
Fractures—Lower jaw, 52. Spine, 52, 53. Ribs (simple and complicated fractures), 53 to 55. Breast-bone, 55. Collar-bone, 55 to 58. Arm, close to shoulder, 58. Arm, near middle of shaft, 58, 59. Arm or forearm when the elbow is involved, 59, 60. Forearm, 60, 61. Crushed hand, 60, 61. Pelvis, 62. Thigh (man), 62–64. Thigh (woman, or man when single-handed), 64. Knee-cap, 64–66. Leg (man), 66, 67. Leg (woman, or man when single-handed), 67, 68. Crushed foot, 68.
Dislocations—Out of doors and indoors 68, 70
Sprained ankle 70
Strains and ruptured muscles 71

Chapter III.

THE CIRCULATION OF THE BLOOD.

The organs concerned in the circulation of the blood are the **Heart,** the **Arteries,** the **Veins,** and the **Capillaries.**

The Heart is a muscular organ which acts like a pump. It is situated in the chest behind the breast-bone and rib cartilages, between the lungs and immediately above the diaphragm; it lies obliquely with a quarter of its bulk to the right, and the remaining three-quarters to the left of the middle line of the body. Its beat may be felt just below and to the inner side of the left nipple. The heart has four cavities, two on either side of a central partition. The two upper cavities are named the **right and left auricles,** the two lower the **right and left ventricles.**

Arteries are vessels which convey blood *from* the heart. Veins carry blood *to* the heart. Capillaries connect the arteries and veins.

In the general (systemic) circulation arterial blood is driven from the left ventricle of the heart into the aorta (the main artery of the body). From the aorta branch arteries are given off to all parts of the body. These divide and sub-divide, and become so small as to assume microscopic dimensions, when they are termed capillaries.

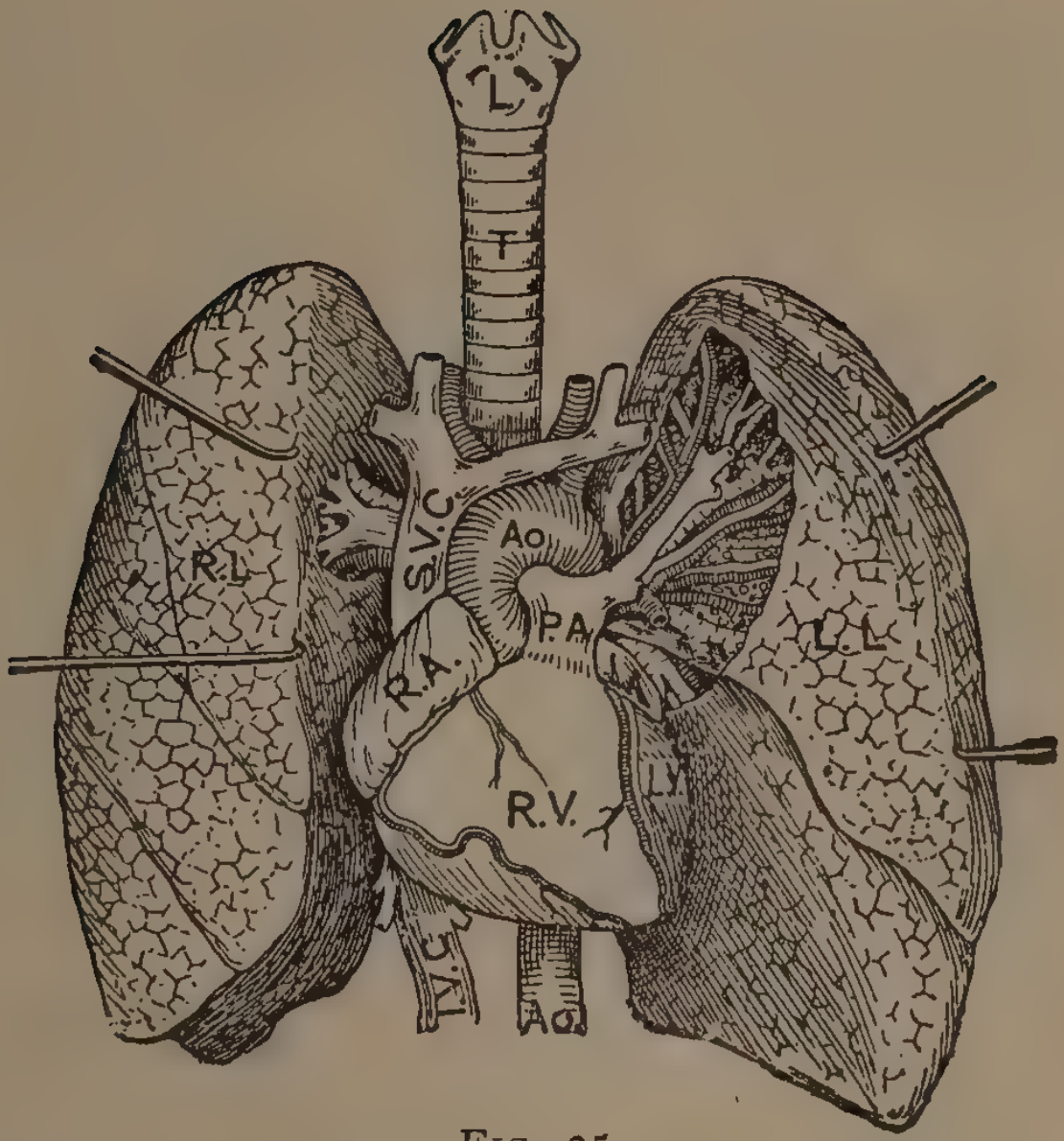


FIG. 35.

L. Larynx (voice box); T. Trachea (wind-pipe); R.L. Right Lung; L.L. Left Lung (the lungs are drawn back to expose the heart and blood vessels); R.A. Right Auricle; L.A. Left Auricle; R.V. Right Ventricle; L.V. Left Ventricle; P.A. Pulmonary Artery; Ao. Aorta; S.V.C. Superior vena cava (the large vein carrying blood from the upper part of the body to the heart); I.V.C. Inferior vena cava (the large vein carrying blood from the lower part of the body to the heart). The four pulmonary veins cannot be shown in the diagram.

In the capillaries an interchange of gases and fluids takes place, whereby the nourishment and maintenance of the tissues and organs of the body are provided for, and the blood becomes dark and impure (venous blood).

Venous blood passes from the capillaries to the veins, which convey it towards the heart, getting larger and larger as they proceed by being joined by neighbouring veins until they finally, as two large vessels, reach the right auricle of the heart. The veins, especially in the limbs, are provided with valves at frequent intervals, which prevent the backward flow of the blood.

The pulmonary system of blood vessels is concerned in carrying the blood through the lungs. From the right auricle the blood passes to the right ventricle, and is thence carried by the pulmonary arteries to the lungs, where it is purified in the capillaries by contact with air, and becomes scarlet in colour; it is then conveyed by the pulmonary veins to the left auricle of the heart and passes into the left ventricle, thus completing the circulation.

The heart contracts in adults at an average rate of seventy-two times a minute, but the rate varies, increasing as the position is changed from the lying to the sitting or to the standing position; hence the importance of adjusting the patient's position in cases of hæmorrhage. At every contraction of the left

ventricle blood is forced into the arteries, causing the **pulse,** which may be felt wherever the finger can be

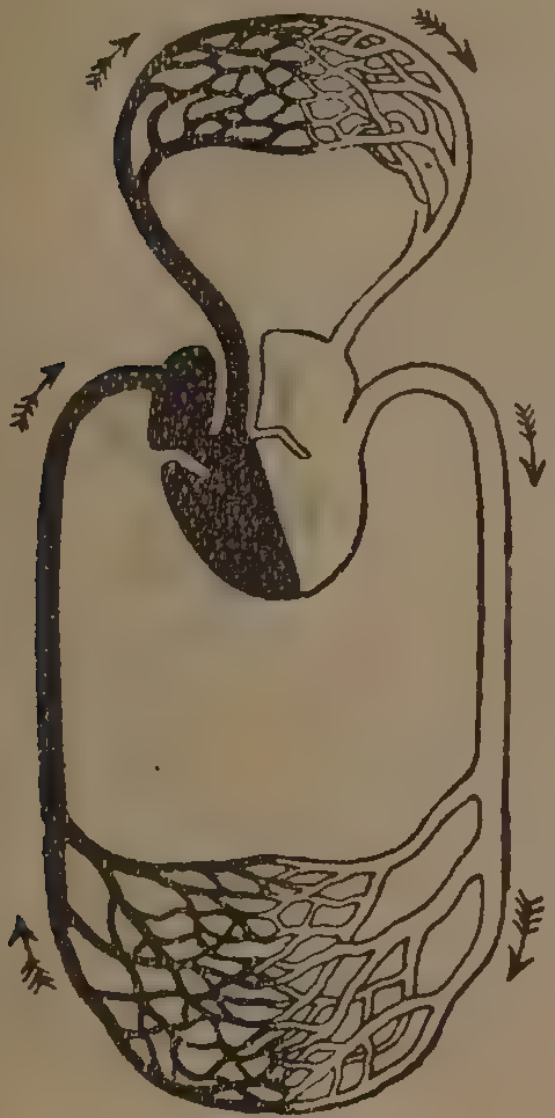


FIG. 36.
DIAGRAM OF THE CIRCULATION OF THE BLOOD.

Explanation.—In the middle of the diagram is the heart with its four chambers. Above the heart is shown the lung (pulmonary) circulation. The lower part represents the general (systemic) circulation. Vessels containing impure (venous) blood are shown black, while those containing pure (arterial) blood are shown white. The connecting vessels represent the capillaries. The arrows show the direction of the flow of blood.

placed on an artery as it lies over a bone. In the veins no pulse is to be found.

WOUNDS AND HÆMORRHAGE.

In all cases the object of First Aid is two-fold :—

1.—**To stop the bleeding.**

2.—**To protect the wound against germs.**

Hæmorrhage, or bleeding, is of three kinds :—

1. Arterial. 2. Venous. 3. Capillary.

Arterial Hæmorrhage.

1.—**Blood from an artery is scarlet.**

2.—**If the wounded artery is near the skin the blood spurts out in jets** corresponding to the pulsation of the heart.

3.—**The pressure point** (see below) **is on the heart side of the wound.**

General Rules for Treatment of a Wound accompanied by Arterial Hæmorrhage.

1. **Place the patient in a suitable position,** bearing in mind that blood escapes with less force when the patient sits, and is still more checked when he lies down.

2. **Except in the case of a fractured limb, elevate the bleeding part,** as thereby less blood finds its way into it.

3. **Expose the wound,** removing whatever clothing may be necessary.

4. **Immediately apply pressure with the thumb or fingers directly on the bleeding spot** (direct digital pressure). When making digital

pressure avoid crooking the thumb or fingers and digging the tips into the part. Direct pressure must not be made over a fracture or foreign body.

If the wound is large, or if it contains a foreign body or is associated with a fracture, **apply indirect digital pressure,** *i.e.*, with the thumb or fingers on the pressure point (see numbered dots on Frontispiece) next to the wound on the heart side. The nearest pressure point is chosen in order to avoid cutting off the circulation from as much of the part as possible, but sometimes it is necessary to apply pressure still nearer to the heart.

5. **Maintain indirect pressure** by a tourniquet, pad and bandage, or flexion on the pressure point (see Rule 4) while the wound is being examined and protected.

To improvise and apply a tourniquet :—

(*a*) Apply a firm pad on the pressure point.

(*b*) Encircle the limb by a narrow bandage, strap or cord with its centre over the pad, and tie the ends in a half knot on the opposite side.

(*c*) Lay a short stick, pencil, stem of a pipe or other similar thing on the half knot, and over it tie a reef knot.

(*d*) Twist the stick to tighten the bandage, thereby pressing the pad upon the artery, and arresting the flow of blood.

(*e*) Lock the stick in position by the ends of

the bandage already applied, or by another bandage passed round the stick and limb.

The pad of the tourniquet must be accurately placed upon the pressure point so as completely to

FIG. 37.

compress the artery ; otherwise arterial blood will be allowed to pass along the limb, and the veins, being compressed by the tourniquet, will not allow the

blood to return through them to the heart, and the result will be dangerous swelling and congestion.

Should a suitable pad not be at hand, a knot may be made in the centre of the bandage, and when available, a stone, cork, etc., enclosed in it to give it firmness and bulk. See that the bulging and not the flat side of the knot is next the skin.

The St. John tourniquet (Fig. 37) consists of a piece of webbing two inches wide (B), provided with a buckle (D), pad (A) and twister (C) over the pad. First place the pad on the pressure point, pass the band round the limb and buckle firmly; then, after noting that the pad is in correct position, apply sufficient pressure with the twister to arrest hæmorrhage, keeping the twister as near the centre of the pad as possible. Finally secure the twister by the string (E) passing through it, which should be tied to the D of the buckle, or may be temporarily secured by passing it between the strap and the part of the buckle on which the spikes rest.

The use of elastic bandages, except when part of a limb is cut or torn off, is to be rigorously avoided, as it stops the return flow of blood through the veins.

Flexion consists of the application of a pad on the pressure point at the knee or elbow joint, flexing the limb to make pressure, and securing the limb in the flexed position by a bandage crossed like the figure 8.

6. Avoid contamination of the wound by the introduction of minute living organisms called germs, which are present in the air, in water, and on all surrounding objects, such as the hands, clothes, etc. It is very easy to introduce germs into a wound :—

(*a*) By touching it, unless the hands are perfectly clean and have been rendered sterile by painting them with the mild tincture of iodine (as supplied to members of the St. John Ambulance Brigade in ampoules, which are convenient to carry and prevent the evaporation of the spirit in which the iodine is dissolved) or rubbing them with spirit (methylated or otherwise).

(*b*) By washing it with water which has not been previously sterilised, that is, boiled and allowed to cool.

7. Remove foreign bodies, such as broken glass, bits of clothing, hair, etc., seen in the wound; do not search for foreign bodies you cannot see.

8. If the wound is obviously dirty, and surgical aid cannot be procured at once, wash away as much of the dirt as possible by pouring sterilised water over it freely, notwithstanding the fact that wounds heal best if kept dry. **Never wash the surrounding parts towards a wound.**

9. Apply the mild tincture of iodine all over the wound and the surrounding skin, and

Cover with a clean, dry, soft and absorbent dressing, such as sterile gauze or lint, boracic lint, a perfectly clean handkerchief or piece of linen. Clean unprinted paper, such as the inside of an envelope, may be used in emergency.

10. **Place a pad over the dressing** unless :—

(*a*) Foreign bodies, of a character to do further damage if pressed upon, are suspected to be left in the wound.

(*b*) There is danger of causing injury to a fracture.

To form a pad, take a handkerchief and fold the four corners to the centre and continue folding until the desired object is attained. The smooth surface is placed on the dressing, and to prevent the pad from unfolding the puckered surface may be stitched or fixed by a safety pin. A hard substance, such as a stone, may be enclosed in the centre of the pad.

11. **Apply a bandage firmly over the pad.**

12. **When, in accordance with Rule 10, a pad has been applied, relax indirect pressure, but not direct pressure, and note whether bleeding has been stopped by the direct method.** If it has, indirect pressure is not to be renewed, but the tourniquet should be left in position. If direct pressure has been unsuccessful continue indirect pressure, but be very apprehensive of causing congestion in the limb, which will be the case if indirect pressure is maintained too long. Prompt steps to obtain medical

help are therefore extremely necessary. If it is not obtainable within half an hour, at the end of that time, or sooner if the tourniquet is causing much pain, again relax indirect pressure and note whether bleeding recurs. If necessary, re-apply indirect pressure, and repeat these steps at intervals of half an hour until medical help is obtained.

13. Afford support to the injured part.

14. Do not disturb a clot of blood formed over a wound. A blood clot serves the double purpose of keeping blood in and germs out.

15. Do not apply sticking plaster or ointment to a recent wound.

When part of a limb has been torn off or the wound is lacerated (for example, by the claw of an animal or by machinery), hæmorrhage frequently does not come on at once, but, as there is a danger of severe hæmorrhage later, a tourniquet should be applied to the limb, but not tightened unless necessity arises.

Students practising arrest of arterial hæmorrhage in the limbs or neck should feel the pulse of the radial, posterior tibial, or temporal artery, as the case may be, to note when the flow of blood in the artery stops, and should then immediately relax the pressure made on the artery. In this way the importance of the accurate application of pressure will be realised, and the amount of force necessary will be ascertained.

The Course of the Main Arteries, and the Arrest of Hæmorrhage.

(The numbers of the pressure points refer to those on the Frontispiece.)

The Large Arteries Within the Chest and Abdomen.

The Aorta is the central or trunk artery of the body. Commencing at the left ventricle, it forms an arch behind the upper part of the breast-bone. From the arch are given off the large branches which carry the blood to either side of the head and neck and to the upper limbs. The Aorta passes down on the left of the spine to just below the navel, where it divides into two great branches (the iliacs) which convey the blood to the organs in the pelvis and to the lower limbs.

Wounds of these arteries are one cause of internal hæmorrhage (see page 104).

Arteries of the Head and Neck.

The Carotid Arteries (right and left) leave the upper part of the chest and pass up on either side of the windpipe and, just below the level of the angle of the lower jaw, divide into the Internal and External Carotid Arteries. **The Internal Carotid Artery** ascends deeply in the neck, and enters the cranium to supply the brain with blood. **The External Carotid Artery** gives off a number of branches; to

the front the artery of the tongue (Lingual), the artery to the face (Facial); to the back the Occipital; the artery itself is continued upwards in front of the ear, where it changes its name to the Temporal, and supplies the scalp in the neighbourhood of the temples.

When a Carotid Artery is wounded, as in the case of a cut throat, apply the thumb of one

FIG. 38.

FIG. 39.

hand on the artery at pressure point 1, pressing backwards against the backbone and taking care to avoid the windpipe. It may also be necessary to apply pressure with the other thumb above the wound for two reasons: (*a*) To arrest the flow of blood from the main (jugular) vein in the neck, which runs

alongside of the carotid artery and is usually wounded at the same time; (*b*) To check the flow of blood from the upper end of the carotid artery itself, which is often considerable owing to communication between the branches of this artery and those of its fellow. Digital pressure must be maintained, by

FIG. 40.

FIG. 41.

relays of assistants if necessary, until the doctor arrives (Fig. 38).

The Facial Artery crosses the lower jaw in a slight hollow two fingers' breadth in front of the angle, and sends branches to the chin, lips, cheek, and outside of the nose. Hæmorrhage from wounds of the face below the level of the eye is to be arrested by:—

(*a*) Digital pressure on pressure point 2 (Fig. 39).

(*b*) Grasping the lips or cheek on both sides of the wound by the finger inside and the thumb outside the mouth or *vice versa*.

(*c*) Applying a pad and bandage like that described for fracture of the lower jaw, crossed and tied over pressure point 2 (see Fig. 18, page 51).

The Temporal Artery may be felt pulsating in front of the upper part of the ear. Hæmorrhage from the region of the temple may be arrested by pressure applied at pressure point 3 (Fig. 40).

FIG. 42.

The Occipital Artery supplies branches to the region of the scalp from behind the ear to the back of the head. Hæmorrhage from this region may be arrested by digital pressure on pressure point 4, four fingers' breadth behind the ear (Fig. 41). This point is difficult to find, and it is usually sufficient to apply pressure immediately below the wound.

Hæmorrhage from the Forehead or anywhere in the Scalp may be arrested by applying a

small firm pad on the bleeding point and securing it by a narrow bandage with its centre laid on the pad, the ends carried round the head in the direction most convenient, and tied tightly over the pad (Fig. 42).

When a wound of the forehead or scalp is associated with a fracture, the best plan is to apply a ring pad around the seat of injury. To make a ring pad, pass one end of a narrow bandage round your

FIG. 43.

FIG. 44.

fingers; pass the other end of the bandage through the ring thus formed and continue to pass it through and through until the whole of the bandage is used and a ring as shown in Fig. 43 is formed.

ARTERIES OF THE UPPER LIMBS.

The Subclavian Artery passes from a point behind the inner end of the collar-bone across the first rib to the armpit.

To apply digital pressure :—

1.—Bare the neck and upper part of the chest.

2.—Place the patient's arm against the body so as to depress the shoulder, and cause him to incline his head towards the injured side.

3.—Take your stand opposite the shoulder.

4.—Using the left hand for the right artery, and *vice versa*, grasp the neck low down, placing the fingers behind the shoulder and the thumb immediately above the centre of the collar-bone in the hollow between the muscles attached to the bone (pressure point 5).

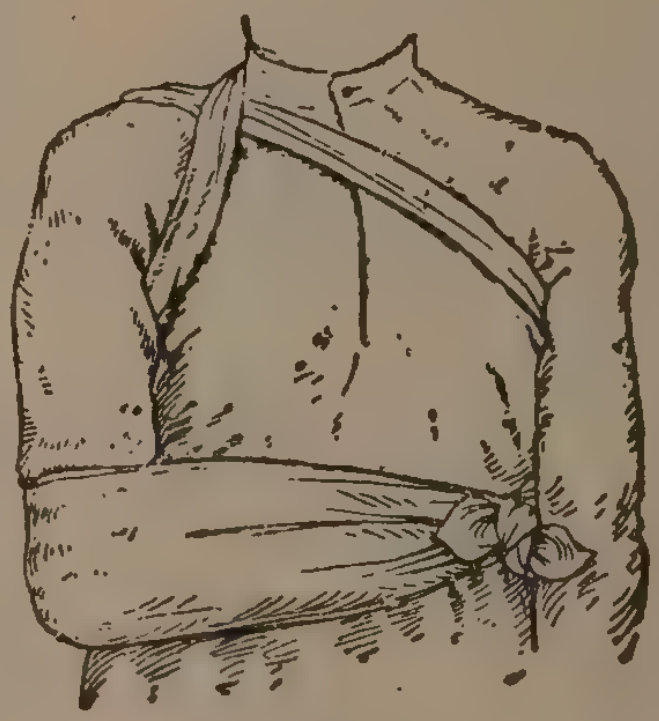


FIG. 45.

5.—Press the thumb deeply downwards and backwards against the first rib, which is beneath the collar-bone at this spot (Fig. 44).

The Axillary Artery, which is a continuation of the Subclavian, keeps close to the shoulder joint,

and can be felt pulsating when the fingers are deeply pressed into the armpit. Digital pressure is difficult to apply to this artery.

To apply a pad and bandage:—

1.—Place a hard pad the size of a billiard ball in the armpit (pressure point 6).

2.—Apply the centre of a narrow bandage on the pad; cross the bandage on the shoulder; pull the ends tight and tie them under the

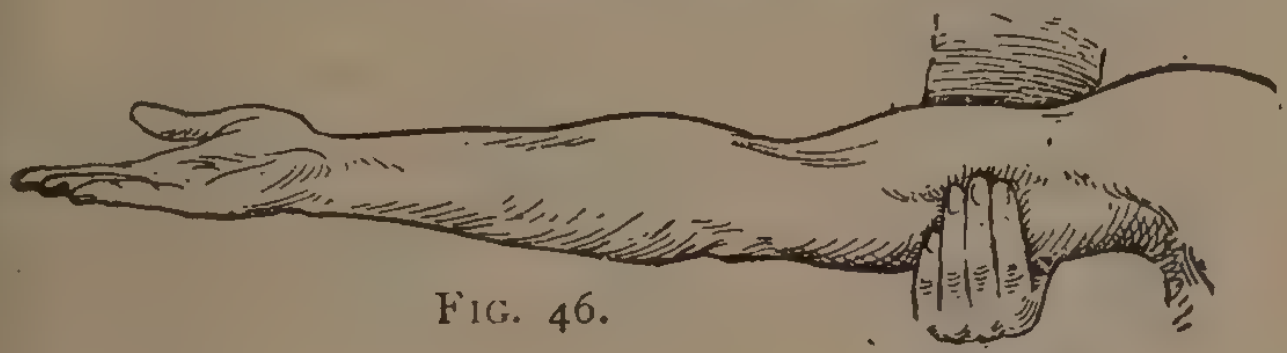


FIG. 46.

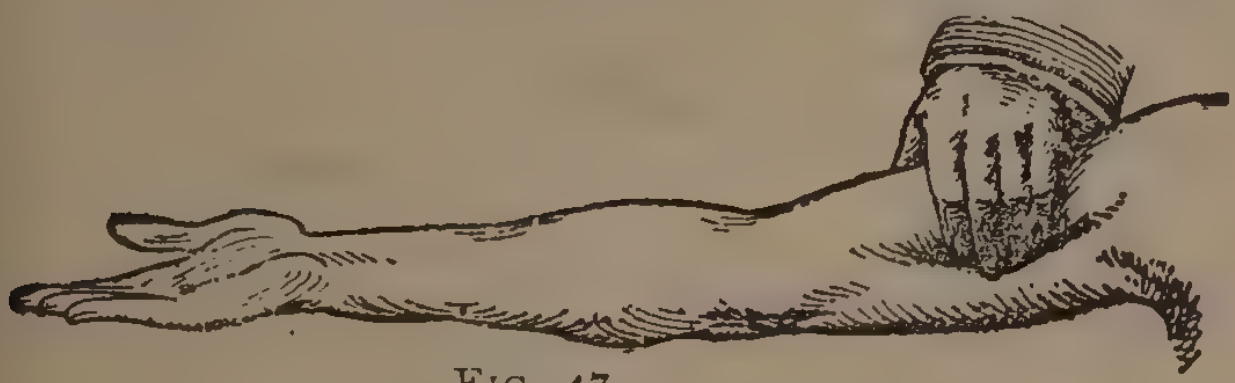


FIG. 47.

opposite armpit, taking care that the pad does not slip.

3.—Flex the forearm and tie the limb tightly to the trunk with a broad bandage, applied on a level with the elbow (Fig. 45)

The Brachial Artery is a continuation of the Axillary, and runs down the arm on the inner side of the biceps muscle, gradually passing forward until it reaches the middle of the front of the elbow. The inner seam of the coat above the elbow roughly indicates its course.

FIG. 48.

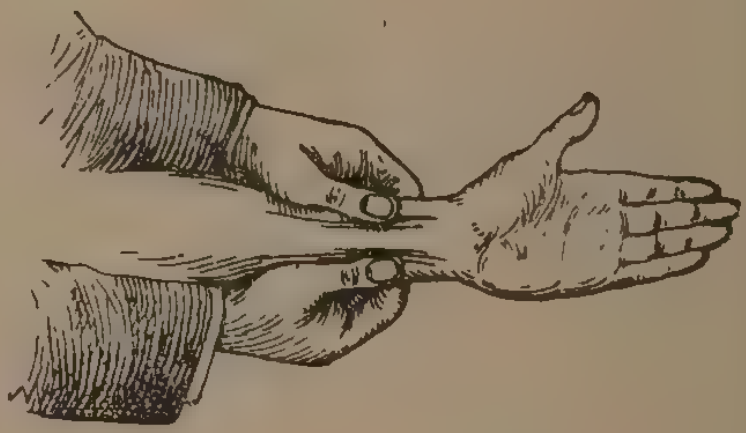


FIG. 49.

Digital or instrumental pressure may be applied at or near pressure point 7.

To apply digital pressure extend the limb at right angles to the body, palm of the hand upwards. Stand behind the limb, and pass the fingers under the back of the arm over the seam of the coat or the groove on the inside of the biceps muscle. Press the pulps

(not the tips) on the artery (Fig. 46). Some prefer to pass the hand over the front of the muscle (Fig. 47). A slight turn of the hand outwards as it grasps the arm will better ensure compression of the artery.

The Brachial artery may be compressed at the elbow (pressure point 8) by flexion. The pad may be a folded handkerchief with a small stone or a cork wrapped up in it, but when no pad is available the coat sleeve rolled or gathered up will serve instead (Fig. 48).

Just below the elbow the Brachial artery divides into the **Radial and Ulnar arteries,** which run along the front of the forearm on the outer and inner sides respectively. The pressure points (9 and 10) are about one inch above the wrist and about half an inch from the outer and inner sides of the forearm, where the arteries may be felt pulsating. Branches of these arteries join to form the **Palmar Arches** in the hand. The arteries run along on either side of the fingers to the tip.

Pressure may be applied to the Radial and Ulnar arteries at pressure points 9 and 10, by the thumbs (Fig. 49) or as follows :—

1. —Cut the cork of a quart or pint bottle in two lengthwise.
2. —Lay the rounded side of one half on the Radial, and of the other half on the Ulnar artery.
3. —Secure them by a tight bandage.

To arrest hæmorrhage from the palm of the hand:—

1.—Apply a firm pad, and make the patient grasp it firmly.

2.—Spread out a triangular bandage, turn up the base about four inches, lay the back of the patient's hand on the centre of the bandage, fold the point over the knuckles and wrist, pass the two ends round the wrist, make the patient pull on the point of the bandage, cross the ends over the fingers twice and tie them as firmly as possible. Bring the point (A) down to the knuckles and fasten with a pin at B (Fig. 50).

3.—Elevate the forearm and support it with a "St. John" sling (see page 56).

Arterial hæmorrhage from the fingers may be arrested by applying a small pad on the wound, and securing it firmly with a strip of tape, linen or plaster.

FIG. 50.

ARTERIES OF THE LOWER LIMBS.

The Femoral Artery, a continuation of the iliac, enters the thigh in the centre of the fold of the groin, where it may be felt pulsating immediately below the skin. The course of the artery may be

indicated by a line drawn from the centre of the groin to the inner side of the back part of the knee. After traversing two-thirds of this line, the Femoral artery passes behind the thigh bone to the back of the knee joint as the **Popliteal artery.**

Digital pressure may be applied to the Femoral artery at the groin (pressure point 11) as follows :—

1.—Lay the patient on his back.

2.—Kneel beside the patient, facing his feet.

3.—To find the groin, raise the foot high so as to flex the thigh ; the fold in the clothing at the top of the thigh will indicate the groin.

4.—Place the thumbs one on the other upon the pressure point, grasping the thigh with the hands (Fig. 51).

5.—Press firmly against the brim of the pelvis.

FIG. 51.

As there is immediate danger of death it is important not to waste time in removing the trousers.

When the Femoral artery is wounded in the upper third of its course, pressure must be maintained at the groin. No really satisfactory tourniquet has been devised for compression at this point, and relays of

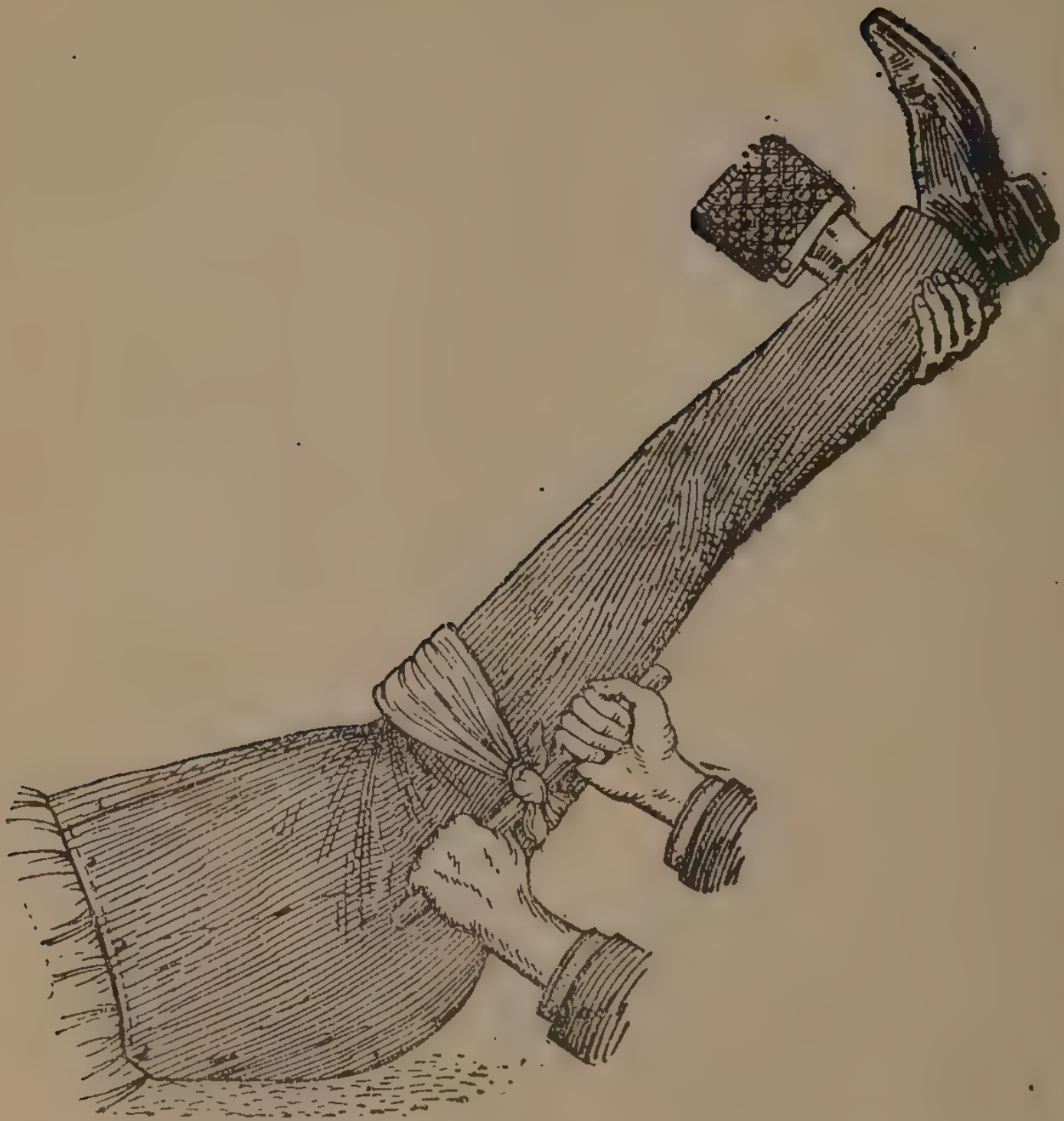


FIG. 52.

assistants should be employed to keep up the pressure until the doctor arrives; each fresh assistant places his thumbs over those of his predecessor, who slips his away from beneath, and thus gushes of blood are prevented during the change.

Application of a tourniquet to the Femoral artery (pressure point 12) :—

When practising compression of this artery, it is a

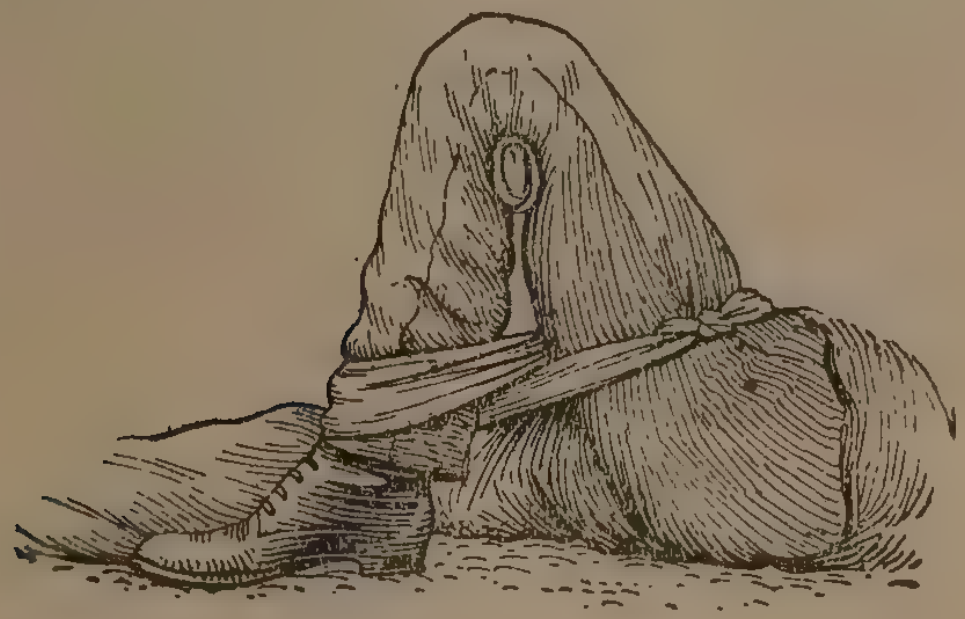


FIG. 53.

good plan to draw a chalk line from the centre of the groin to the inner side of the back of the knee; place the pad of the tourniquet on this line as high up as the bandage can be applied. The pad should be the size of a lawn tennis ball (Fig. 52).

Pressure may be applied to the **Popliteal artery** by

flexion at the knee (pressure point 13); the pad should be the size of a lawn tennis ball, or if no pad is available the trouser leg may be rolled or gathered up to serve instead. It is not necessary to take off the clothing (Fig. 53).

Just below and behind the knee joint the Popliteal artery divides into the Anterior (front) and Posterior (back) Tibial arteries.

The Posterior Tibial Artery passes down the back of the leg to the inner side of the ankle. It is at first deeply placed between the muscles of the calf, but it approaches the surface as it proceeds, so that it can be felt pulsating behind the large bone at the inner side of the ankle. It enters the sole as the **Plantar Arteries,** which run forward amongst the muscles to supply the foot and toes.

The Anterior Tibial Artery, on leaving the Popliteal, at once passes forward between the leg bones, and, deeply placed amongst the muscles, runs down the leg to the centre of the front of the ankle. This artery is continued as the **Dorsal Artery of the Foot,** which, passing forward over the tarsus, dips down to the sole between the first and second metatarsal bones. Here it forms with the Plantar arteries what is known as the **Plantar Arch.**

At the ankle (pressure points 14 and 15) pressure may be applied by the fingers or by pads and bandages.

Venous Hæmorrhage.

1.—**Blood from a vein is dark red.**

2.—**It flows in a slow continuous stream.**

3.—**It issues from the side of the wound further from the heart.**

4.—**In the case of a wound of a varicose vein** it flows also from the side of the wound nearer to the heart, especially if the patient is kept standing.

Varicose Veins.—The veins of the leg are specially apt to become varicose. A varicose vein is permanently dilated, winding, and with bead-like projections along its course. A vein becomes varicose from several causes, such as long standing or tight garters. The first effect is to throw extra work upon the valves, and the bead-like projections are caused by the blood accumulating in the pockets behind the valves. In time the vein becomes so dilated that the valves can no longer span it, thus allowing the backward flow of blood.

General Rules for Treatment of a Wound accompanied by Venous Hæmorrhage.

1.—Adopt the course laid down in Rules 1—3 on page 80.

2.—**Apply direct digital pressure** (except over a fracture or foreign body).

3.—**Remove any constrictions,** such as collar and garters, from the heart side of the wound.

4.—**Apply a firm bandage** near the wound on the side away from the heart. In the case of a wound of a varicose vein it is also advisable to apply a firm bandage immediately above the wound, especially if the limb cannot be maintained in an elevated position.

5.—Adopt the course laid down in Rules 6—15 on pages 84 to 86.

Capillary Hæmorrhage.

1.—The blood is red.

2.—It flows briskly in a continuous stream or may merely ooze from the wound.

3.—It wells up from all parts of the wound.

General Rules for Treatment of a Wound accompanied by Capillary Hæmorrhage.

A small amount of direct pressure will suffice to arrest capillary hæmorrhage. It must not, however, be supposed that a wound requires less protection because the bleeding is not severe; in fact, the reverse is the case, as a considerable flow of blood tends to cleanse the wound from the inside outwards.

BITES OF SNAKES AND RABID ANIMALS, AND WOUNDS BY POISONED WEAPONS.

Hydrophobia is caused by the bite of an animal, such as a dog, cat, fox, wolf, or deer suffering from rabies. The special poisons introduced into bites by venomous snakes and wounds by poisoned weapons cause immediate danger to life.

Treatment.

1.—Immediately place a constriction between the wound and the heart so as to prevent the venous blood from carrying the poison through the body. If, for example, a finger is bitten, it should be encircled on the side of the wound nearest to the heart, with the finger and thumb, and as soon as possible a ligature (a string, piece of tape, or strip of handkerchief) should be placed tightly round the root of the finger. Compression with the finger and thumb must not be relaxed until the ligature has been applied. Additional ligatures may, with advantage, be applied at intervals up the limb.

2.—Encourage bleeding for a time, to wash the wound from within outwards :—

(*a*) By bathing the wound with warm water.

(*b*) By keeping the injured limb low ; the upper limb should be allowed to hang down, and in the case of the lower limb the patient should be seated with the foot on the ground.

3.—Cauterise the wound, if it is quite impossible to obtain the services of a doctor. This is best done by burning with a *fluid* caustic, such as pure carbolic acid or nitric acid, or if these are not at hand, with a red-hot wire or a fusee. To ensure the caustic reaching the bottom of the wound, it

should be applied on a piece of wood, such as a match cut to a point. When the caustic has been thoroughly applied, but not till then, the ligatures may be removed.

4.—**In the case of a bite by a venomous snake,** in addition scratch the skin round the wound and rub in powdered permanganate of potash.

5.—**Cover the wound,** after a while, with a clean dressing.

6.—**Afford support to the injured part.**

7.—**Treat shock** (see page 142).

INTERNAL HÆMORRHAGE.

Wounds of the blood vessels within the trunk cause hæmorrhage into the cavity of the chest or of the abdomen.

Signs and Symptoms of Internal Hæmorrhage.

1.—Rapid loss of strength, giddiness and faintness, especially when the upright position is assumed.

2.—Pallor of the face and lips, and cold clammy skin.

3.—The pulse fails, and may altogether disappear at the wrist.

4.—Breathing hurried and laboured, and accompanied by yawning and sighing.

5.—The patient throws his arms about, tugs at the clothing round the neck, and calls for air (air hunger).

6.—Finally the patient may become totally unconscious.

Treatment.

1.—Keep the patient in a recumbent position, with head low and turned on one side.

2.—Undo all tight clothing about the neck.

3.—Provide for free circulation of air; fan the patient.

4.—Sprinkle cold water on the face; hold smelling salts to the nostrils; avoid other forms of stimulants, at all events until the hæmorrhage has been controlled.

5.—Give ice to suck or cold water to drink; if the seat of the hæmorrhage is known, apply an ice bag over the region.

6.—Should the patient be reduced to a state of collapse, raise the feet and bandage the limbs firmly from the toes to the hips and from the fingers to the shoulders.

HÆMORRHAGE FROM THE NOSE (NOSTRILS).

1.—Place the patient in a sitting position in a current of air before an open window, with the head thrown slightly back and the hands raised above the head.

2.—Undo all tight clothing around the neck and chest.

3.—Apply cold (ice, a cold sponge or bunch of keys) over the nose and also the spine at the level of the collar ; place the feet in hot water.

4.—Cause the patient to keep the mouth open, and so avoid breathing through the nose.

HÆMORRHAGE FROM THE MOUTH.

Blood issuing from the Mouth may come from the tongue, the gums, the socket of a tooth after extraction, the throat, the nose, the lungs, or the stomach.

Hæmorrhage from the Tongue, the Gums, the Socket of a Tooth, or the Throat.

1.—Give ice to suck or cold water to hold in the mouth. If this is not successful, give water as hot as can be borne to hold in the mouth.

2.—If bleeding from the front part of the tongue is excessive, compress the part by a piece of clean lint held between the finger and thumb.

3.—If the bleeding is from the socket of a tooth, plug the socket with a piece of clean lint or cotton wool ; over this place a small cork or other substance of suitable size, and instruct the patient to bite on it.

Hæmorrhage from the Lungs.

Blood from the lungs is coughed up, and is scarlet and frothy in appearance.

Treat as for Internal Hæmorrhage (see page 104).

Hæmorrhage from the Stomach.

Blood from the stomach is vomited; it is of a dark colour and has the appearance of coffee grounds; it may be mixed with food.

Treat as for Internal Hæmorrhage (see page 104), except that nothing is to be given by the mouth.

Hæmorrhage from the Ear Channel.

Blood issuing from the Ear Channel, which generally indicates a fracture of the base of the skull, must be wiped away as it issues; no attempt is to be made to plug the ear.

BRUISES.

A blow anywhere on the surface of the body may cause extensive hæmorrhage beneath the skin, without breaking it—a "black eye" is an instance. The injury is accompanied by discoloration and swelling.

Treatment.

Apply a piece of lint soaked in spirit and water, or ice or cold water dressings.

QUESTIONS ON CHAPTER III.

The numerals indicate the pages where the answers may be found.

	PAGE
What organs are concerned in the circulation of the blood?	76
Describe the heart	76
Describe the circulation of the blood	76-79
How many times a minute does the heart contract on the average?	78
What is the effect of the patient's position on the rate at which the heart contracts?	78
What is the pulse?	79
What is the object of First Aid in connection with wounds and hæmorrhage?	80
How many kinds of hæmorrhage are there? ...	80, 104-107
How would you know a case of arterial hæmorrhage? ...	80
State general rules for treatment of a wound accompanied by arterial hæmorrhage	80-86
Would you always elevate a bleeding limb?	80
How should pressure be first applied?	80
What is direct pressure and when should it be applied?	80
When should direct pressure not be applied?	81
What is indirect pressure and when should it be applied?	81
How should indirect pressure be maintained?	81
What is a tourniquet?	81
How would you improvise and apply a tourniquet? ...	81-83
Why is accuracy necessary in placing the pad of a tourniquet?	82
Describe a St. John tourniquet	83
When may an elastic bandage be used instead of a tourniquet?	83
What is flexion?	83

PAGE

How would you avoid contamination of a wound? ... 84
Should you invariably remove foreign bodies from a wound? 84
What would you do to an obviously dirty wound? ... 84
How would you dress a wound? 84, 85
What would guide you in placing a pad over a wound? 85
How long would you maintain indirect pressure, and what would guide you in discontinuing it? 85, 86
Should a blood clot be disturbed? Give reason ... 86
Should sticking plaister or ointment be applied to a recent wound?... 86
If part of a limb had been torn off, or the wound was lacerated, but there was not much bleeding, how would you act?... 86
Where would you feel the pulse when practising arrest of arterial hæmorrhage? 86
What is the aorta? 87
Describe the arteries of the head and neck 87–89
Why is it sometimes necessary to compress the carotid artery both below and above the wound? 88, 89
What is a ring pad, and what is its use? 91
Describe the arteries of the upper limbs... 91–95
Describe the arteries of the lower limbs 96–100
How would you know a case of venous hæmorrhage? ... 101
What is a varicose vein? 101
How may a vein become varicose? 101
State the general rules for treatment of a wound accompanied by venous hæmorrhage 101, 102
How would you know a case of capillary hæmorrhage? 102
How would you stop capillary hæmorrhage? 102
State the general rules for treatment of wounds caused by poisonous bites or weapons 103, 104
What special treatment is required for the bite of a venomous snake? ... ... 104.

PAGE
What is internal hæmorrhage? 104
What would lead you to suspect internal hæmorrhage? 104, 105
State the treatment for internal hæmorrhage 105
How would you arrest hæmorrhage from the nose? 105, 106
Where may blood issuing from the mouth come from?... 106
How would you treat bleeding from the gums or throat? 106
What else would you do if the tongue were bleeding?... 106
And if the bleeding were from the socket of the tooth? 106
How would you distinguish between bleeding from the lungs and from the stomach?... ... ... 106, 107
And what would be the difference in the treatment? 106, 107
Of what is bleeding from the ear channel generally a sign? 107
What is a bruise? 107
How would you treat a bruise? 107
The Student should practise placing supposed patients in a proper position for the arrest of hæmorrhage (see pages 80, etc.), folding firm pads, tying hard knots in bandages to form a tourniquet (81), and the application of pressure at all the pressure points shown in the frontispiece, at various points on the forehead and scalp, and on the palm of the hand. Pressure should be digital, by pad and bandage, or flexion, as directed in the text.
Pressure points—Carotid artery, 88. Facial, 89 and 90. Temporal, 90. Occipital, 90. Subclavian, 91. Axillary, 92. Brachial (by pad and bandage, pressure being made against the humerus and by flexion at the elbow), 94, 95. Radial and Ulnar, 95. Femoral at the groin, 97. Femoral in the thigh, 99. Popliteal, 98, 99. Anterior and posterior Tibial arteries, 100.
Hæmorrhage from the forehead or scalp 91
Hæmorrhage from the palm of the hand 96
Venous hæmorrhage from a varicose or other vein ... 101

Chapter IV.

BURNS AND SCALDS.

A burn is caused—

(*a*) By dry heat, such as fire or a piece of hot iron.

(*b*) By a rail, wire or dynamo charged with a high pressure electric current, or by lightning.

(*c*) By a corrosive acid, such as oil of vitriol.

(*d*) By a corrosive alkali, such as caustic soda, ammonia, or quicklime.

(*e*) By friction, caused, for example, by contact with a revolving wheel. (Brush burn.)

A scald is caused by moist heat, such as boiling water, hot oil or tar.

The effect may be a mere reddening of the skin; blisters may be formed; or even the deeper tissues of the body may be charred and blackened. The clothing may adhere to the burnt skin, and its removal is impossible without further detriment to the injured part. The great dangers are Shock and the entry of harmful germs.

Treatment.

1.—**Carefully remove the clothing from the injured part unless it sticks to the skin.** When possible, place the injured part in water at the

temperature of the body (98 degrees) until suitable dressings can be prepared. A dessert-spoonful of baking soda to a pint of the warm water will make a soothing lotion, and serve to soak off any adherent clothing, which may be previously cut around with scissors.

2.—Do not break blisters.

3.—Immediately exclude air by covering the part with cotton wool. If boracic ointment is at hand, it may be spread thickly on narrow strips of lint, which should be applied to the wound and the part enveloped in cotton wool and lightly bandaged. Strips are advisable as they fit better on the part, and during subsequent dressings one strip can be removed at a time and fresh dressings applied before the adjacent strip is taken off. The shock to the system is thereby less than if the whole of the burnt surface were laid bare to the air by the removal of all the dressings at one time.

When the face is burnt, instead of applying the *strips* cut a *mask* out of cotton wool, lint or linen, leaving holes for the eyes, nose and mouth.

As it is important not to leave the part exposed to the air, it is the duty of the bystanders to prepare the dressings while the clothing is being removed.

4.—Treat Shock.—This is particularly necessary in the case of every burn or scald of any considerable extent (see page 142). Be very apprehensive of

danger in the case of even slight burns of the neck.

5.—**If the burn is caused by a corrosive acid, bathe the part with a weak alkaline lotion,** such as washing soda or baking soda in warm water before applying the dressings.

6.—**If the burn is caused by a corrosive alkali, bathe the part with a weak acid lotion,** such as lemon juice or vinegar diluted with an equal quantity of water. *Caution.*—Before using water brush off any lime that remains on the part.

7.—**When a woman's dress catches fire**—

(*a*) Lay the woman flat on the floor at once, so that the flames are uppermost; that is to say, if the front of the dress is on fire lay her on her back, and if the back of the dress is burning, place her face downwards. The reason for this is that flames ascend, so that if the upright position is assumed, the flames will quickly reach and burn the body, neck, and face; or if the woman lies with the flames undermost, they will, if unextinguished, pass over and burn the limbs, and set fire to the rest of the dress.

(*b*) As soon as the woman is laid flat, smother the flames with anything at hand, such as a rug, coat, blanket, or table cover; if made wet so much the better.

(*c*) A woman rendering assistance should hold a rug or blanket in front of herself when approaching the flames.

(*d*) If a woman's dress catches fire when nobody is by, she should lie flat, flames uppermost, smother the flames with anything handy, and call for assistance; on no account should she rush into the open air.

The use of fire guards would prevent many calamities.

STINGS OF PLANTS AND ANIMALS.

These give rise to serious inconvenience, and in some cases grave symptoms develop.

Treatment.

1.—**Mop the part freely with dilute ammonia or spirits.** A paste of bicarbonate of soda and sal volatile is an efficient application. A solution of washing soda or potash or the application of the blue bag will relieve pain.

2.—**Extract the sting** if left in.

3.—**Apply oil or vaseline.**

4.—**Treat shock** if it occurs (see page 142).

FROST BITE.

During exposure to severe cold, parts of the body, usually the feet, fingers, nose, or ears, lose sensation

and become first waxy white and afterwards congested and of a purple appearance. As sensation is lost in the part, it is often only by the remarks of bystanders that the frost-bitten person is made aware of his condition.

Treatment.

1.—**Do not bring the patient into a warm room** until, by friction of the hand or by rubbing with soft snow or cold water, sensation and circulation in the affected parts are restored. Neglect of this precaution may lead to death of the tissues of the frost-bitten part.

2.—**When circulation is restored,** keep the patient in a room at a temperature of 60 degrees.

NEEDLE EMBEDDED UNDER THE SKIN.

When a needle breaks off after penetrating the skin and disappears, take the patient and the broken piece of needle to a doctor at once. If the wound is near a joint, keep the limb at rest on a splint.

FISH-HOOK EMBEDDED IN THE SKIN.

Do not attempt to withdraw the fish-hook by the way it went in, but cut off the dressing of the hook, so that only the metal is left, and then force the point onwards through the skin until the hook can be pulled out. Afterwards apply a hot boracic fomenta-

tion (pink lint soaked in hot water).

FOREIGN BODY IN THE EYE.

1.—**Prevent the patient rubbing the eye,** tying down a child's hands if necessary.

2.—**Pull down the lower eyelid,** when, if the foreign body is seen, it can readily be removed with a camel's hair brush, or with the corner of a handkerchief twirled up and wetted.

3.—**When the foreign body is beneath the upper eyelid** lift the lid forward, push up the lower lid beneath it and let go. The hair of the lower lid brushes the inner surface of the upper one, and may dislodge the body. Should the first attempt be unsuccessful, repeat it several times if necessary. If the foreign body is not dislodged call the services of a doctor as soon as possible. **When, however, skilled help cannot be had,** proceed as follows :—

(*a*) Seat the patient so as to face the light, and stand behind him, steadying his head against your chest.

(*b*) Place a knitting-needle, match or bodkin on the upper eyelid, half-an-inch above the edge, pressing it backwards as far as possible. Pull the upper eye-lashes upwards over it, and thereby evert the eyelid.

(*c*) Remove the foreign body.

4.—When a foreign body is embedded in the eyeball do not attempt to remove it, but drop a little olive or castor oil on the eyeball after pulling down the lower eyelid, close the lids, apply a soft pad of cotton wool, and secure it by a bandage tied sufficiently firmly to keep the eyeball steady; take the patient to a doctor.

5.—When quick-lime is in the eye brush away as much of it as possible; bathe the eye with vinegar and warm water, and treat as for a foreign body embedded in the eyeball.

FOREIGN BODY IN THE EAR PASSAGE.

As a rule make no attempt to treat a patient with a foreign body in the ear if the services of a doctor can possibly be had; any attempts to remove the foreign body may lead to fatal consequences. If a child cannot be induced to keep the fingers from the ear, tie his hands down or cover up the ear. If an insect is in the ear-passage, fill the ear with olive oil, when the insect will float and may be removed. Never syringe or probe the ear.

FOREIGN BODY IN THE NOSE.

Induce sneezing by pepper or snuff. Cause the patient to blow his nose violently after closing the unaffected nostril. If this is ineffectual, take the patient to a doctor.

THE ABDOMEN.

The abdomen is bounded above by the diaphragm; below by the pelvis; behind by the lumbar vertebræ; and in front and at the sides by muscular walls. (Fig. 54.)

The Organs of the Abdomen.

The Stomach lies just below the breast-bone, towards the left side.

The Liver lies in the upper part of the abdomen, where it is mostly covered by the right lower ribs.

The Spleen lies beneath the ribs at the upper part of the left side of the abdomen.

The Pancreas lies behind the stomach.

The Intestines occupy the greater part of the cavity of the abdomen.

The Kidneys lie at the back, one at each side, in the region of the loin.

The Bladder lies to the front in the pelvis.

Wound in the Front Wall of the Abdomen.

When the intestines or other organs protrude through the wound, whether vertical or transverse, bend the knees, raise the shoulders, and apply lint, a towel, or cotton-wool wrapped in soft linen, wrung out of boiling water every two or three minutes, so as not to be allowed to get cold, and keep the patient warm until the doctor arrives. When there is no protrusion

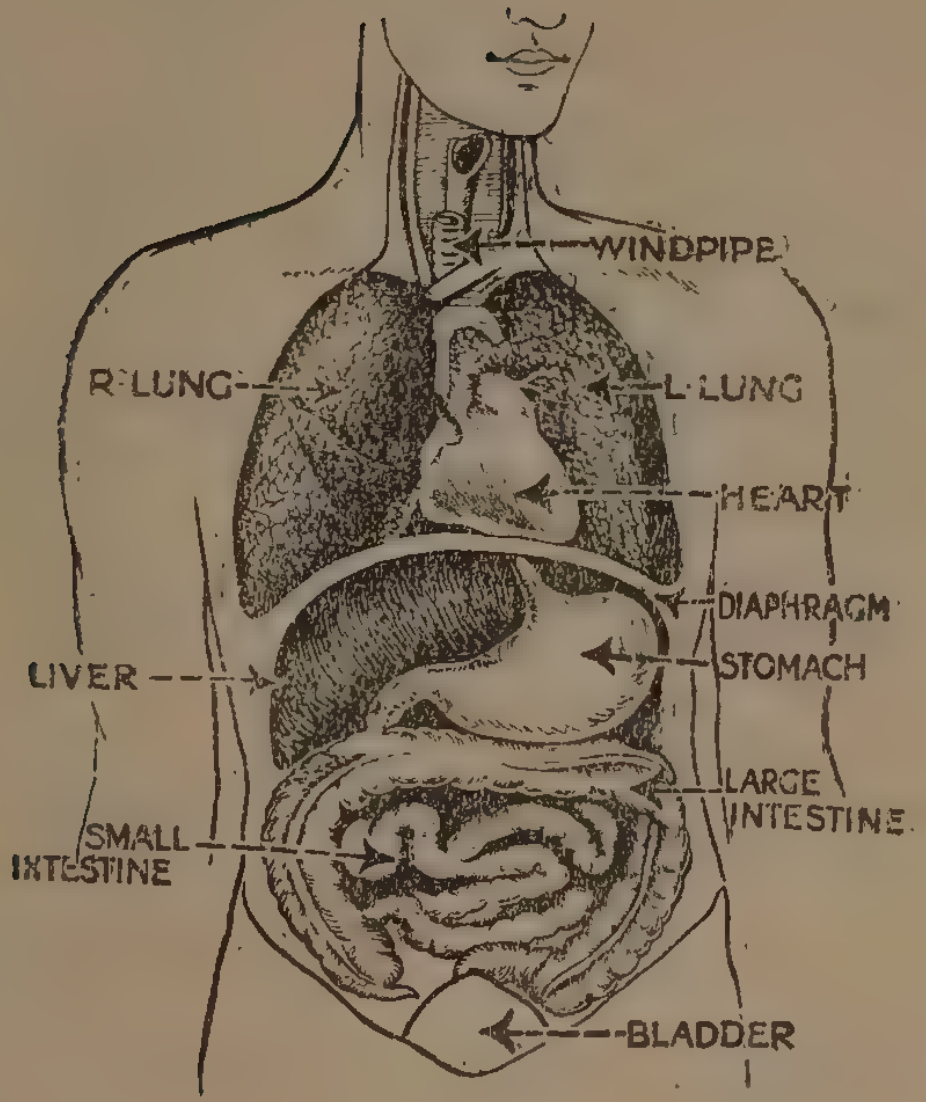


FIG. 54.

of organs, *if the wound is vertical*, lay the patient flat on the back with the lower limbs straight; *if the wound is transverse*, bend the knees and raise the shoulders. In each case treat as an ordinary wound.

Injuries to the Organs Within the Abdomen and Pelvis.

Injuries of the Stomach are attended by extreme collapse, and sometimes by vomiting of dark blood like coffee-grounds. For treatment see "Hæmorrhage from the Stomach" (page 107).

Injuries of the Liver, Spleen, Pancreas or Intestines may be caused by a blow, a stab or a bullet; the liver or spleen may be injured by a fracture of the lower ribs. The Signs and Symptoms are those of internal hæmorrhage accompanied by pain and swelling at the seat of injury, and the treatment is as for that condition (see page 104).

The Kidneys may be injured by a fracture of the eleventh or twelfth ribs, also by a crush, blow, stab or bullet. Blood may escape with the urine, and there may be pain and swelling over the injured kidney.

The Bladder may be injured by a fracture of the pelvis. The signs and symptoms are either inability to pass water, or if a little is passed it is tinged with blood.

Treatment of Injury to the Kidneys or Bladder.

1.—**Keep the patient quiet** until the doctor arrives.

2.—**Apply cold** (ice or cold water) dressings over the painful or injured part.

RUPTURE.

Rupture (hernia) consists of a protrusion of an internal organ, usually the bowel, through the muscular wall of the abdomen, most frequently at the groin. Should a sudden swelling accompanied by pain and sickness take place in that region—

1.—Send for a doctor instantly.

2.—Lay the patient down with a pillow under the knees.

3.—Apply ice or cold water dressings to the affected part.

QUESTIONS ON CHAPTER IV.

The numerals indicate the pages where the answers may be found.

	PAGE
How may a burn be caused?	111
How is a scald caused?	111
What are the great dangers of a burn or scald?	111
State the general treatment for burns and scalds	111–114
How would you treat a burn caused by a corrosive acid?	113
How would you treat a burn caused by a corrosive alkali?	113

PAGE

What steps should be taken when a woman's dress catches fire? 113, 114
How would you treat a sting? 114
State the signs, symptoms and treatment of frost-bite 114, 115
Would you attempt to remove a needle embedded under the skin? 115
How would you extract a fish hook embedded in the skin? 115, 116
State the general rules for removing a foreign body from the eye 116
What would you do if a foreign body were embedded in the eyeball? 117
And when quick-lime is in the eye? 117
How would you try to remove an insect from the ear passage?... 117
Would you try to remove any other form of foreign body from the ear passage?... 117
How would you remove a foreign body from the nose? 117
State the boundaries of the abdomen and its contents ... 118
State the treatment for wounds of the abdomen... 118, 119
How may injuries to the liver, spleen, pancreas or intestines be caused? 120
What is the difference between treatment of injuries to the stomach and of injuries to the liver, spleen, pancreas and intestines? 120
State the treatment of injuries to the kidneys or bladder 120, 121
State the treatment of hernia 121

Chapter V.

THE NERVOUS SYSTEM.

Two systems of nerves, the Cerebro-spinal and the Sympathetic, regulate the movements and functions of the body.

The Cerebro-spinal System.

The Cerebro-spinal System is made up of the Brain, the Spinal Cord and Motor and Sensory Nerves; through its agency sensations are received, and the will causes the action of the voluntary muscles. For example, when a part is injured a sensation of pain is conveyed to the brain by a sensory nerve, thus affording an indication of the seat of injury, or a warning of a possible danger of further damage. On attention being directed to the injury, motor nerves convey a message to the muscles, and an attempt is instantly made to ease the pain or to move the injured part from danger.

The **Brain,** situated within the cranium, is the seat of intellect, the emotions, and the will; it is the organ where impressions brought by sensory nerves are received, and from which orders are given through the motor nerves.

The **Spinal Cord,** which is a continuation of the brain, consists of nervous matter lying within the

spinal canal (see Vertebral Column, page 29). It leaves the brain through an opening in the base of the skull, and extends to the second lumbar vertebra.

The **Nerves** proceed from the brain and spinal cord in pairs as pearly-white trunks, and their branches can be traced throughout the tissues of the body. When a nerve is torn through there is paralysis in the region in which its branches are distributed.

The Sympathetic System.

The Sympathetic System consists of a string of small bodies of nervous tissue called ganglia, connected by nerves extending on each side of the front of the spinal column along its entire length, and sends branches to all the organs of the chest and abdomen to control the involuntary muscles, and thereby regulate the vital functions. This system is not under the control of the will, and acts alike during sleep and activity.

THE RESPIRATORY SYSTEM.

Air is conveyed by the nostrils (or mouth) to the back of the throat, whence it enters the wind-pipe by an opening guarded by a flap (the epiglottis) against the entry of solids or fluids. During insensibility, however, the flap may fail to act, so that, should solids or fluids be given by the mouth, they may enter the wind-pipe and cause choking. Another danger is that the

tongue of an insensible person is very apt to fall back on the flap, and so obstruct the wind-pipe. (Fig. 59, page 138.) The wind-pipe extends to two inches below the top of the breast-bone, where it divides into the right and left bronchus. Each bronchus enters a lung and divides into small and still smaller bronchial tubes, until the ultimate recesses of the lung—the air cells or air spaces—are reached.

The **Lungs,** Right and Left, occupy the greater part of the chest; they lie immediately within the ribs, and practically wherever a rib is felt, whether front, back or sides, there is lung beneath. Each lung is enveloped in a fine membrane (the pleura), which allows it to move within the chest freely during breathing.

Respiration, or breathing, consists of two acts—Inspiration, an enlargement of the chest cavity, during which air is drawn into the lungs, and Expiration, a diminution of the chest, during which air is driven out of the lungs. A pause follows the act of expiration. In health fifteen to eighteen breaths are taken per minute, and at each inspiration about twenty to thirty cubic inches of air enter the lungs, and a similar quantity is expelled at each expiration.

The enlargement and diminution of the chest cavity are effected partly by the muscles of respiration attached to the ribs, but chiefly by the Diaphragm, the large arched muscular partition which separates

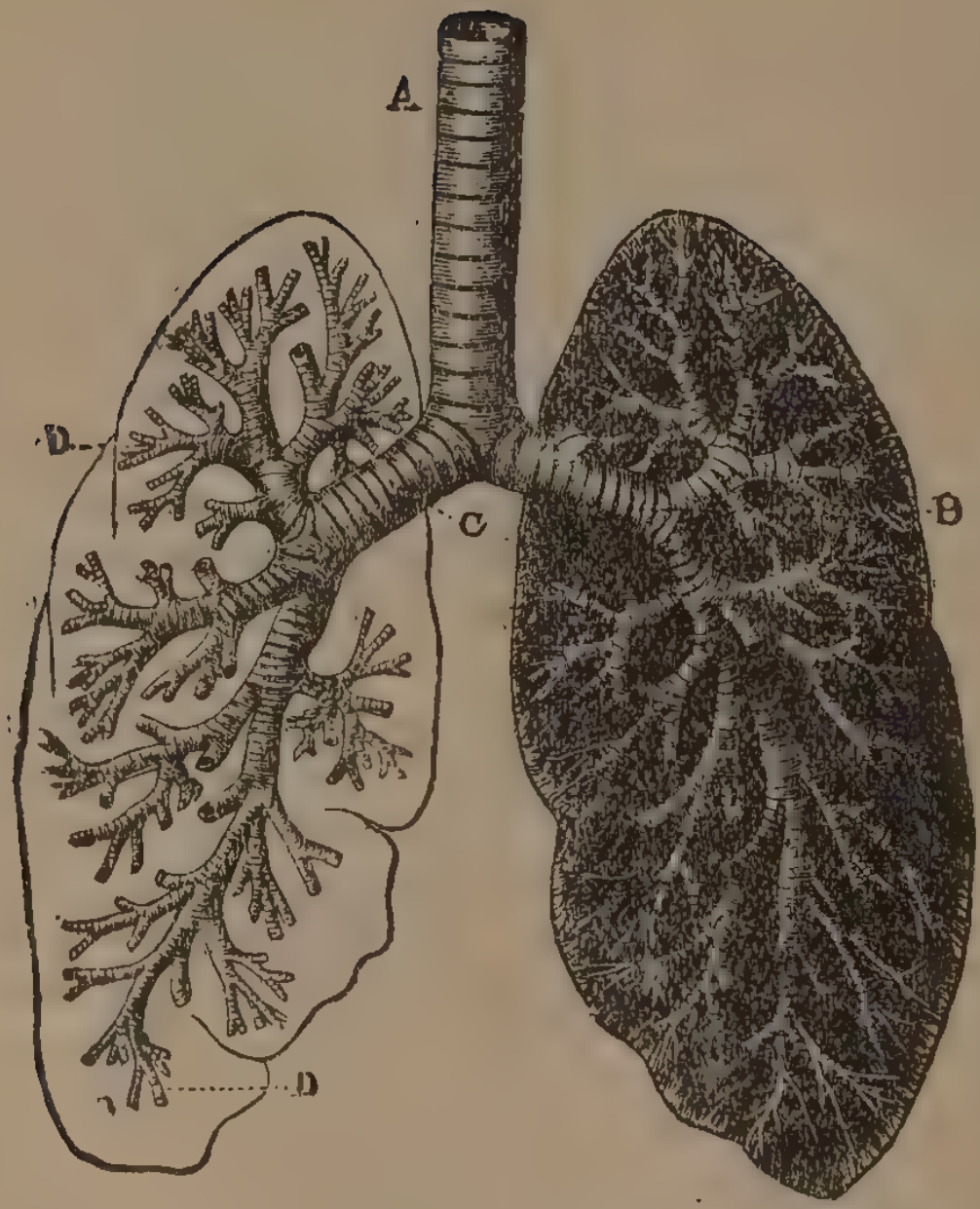


FIG. 55. THE LUNGS AND BRONCHIAL TUBES.

A. Trachea, or Wind-pipe. B. Left Bronchus. C. Right Bronchus. D. Smaller Bronchial Tubes.

the chest from the abdomen. In inspiration, which is chiefly a muscular act, the ribs are raised, and the arch of the diaphragm falls and becomes flattened, thus increasing the capacity of the chest, tending to produce a vacuum and causing air to enter. In expiration, an act performed without muscular effort, the ribs fall and the arch of the diaphragm rises; this lessens the capacity of the chest and forces air out. The mechanism of respiration is somewhat like that of ordinary household bellows; the ribs may be compared to the boards of the bellows, while the diaphragm corresponds to the leather, the air passages being equivalent to the nozzle.

As the blood depends upon air for its purification and the oxygen necessary to maintain life, interference with breathing very soon may produce a dangerous state called asphyxia, examples of which are afforded by drowning, suffocation, choking, etc.

INSENSIBILITY.

Insensibility, apart from natural sleep, is of two degrees, namely, Stupor and Coma. The patient can be aroused with some difficulty from the first, but only with great difficulty, if at all, from the second.

Broadly speaking, the pupils of the eyes (the black part surrounded by the coloured iris) respond to light —that is, contract in a bright light and expand or dilate when the light is reduced—in stupor, but not

in coma. Also the patient will object to the eyeballs being touched in the former but not in the latter state.

The objects of treatment are :—

(*a*) To ensure the action of the heart and lungs.

(*b*) If possible, to prevent stupor from deepening into coma.

The rules for treatment fall under four heads :—

1.—Those which apply **in all cases.**

2.—Those which apply **when breathing is absent—Asphyxia.**

3.—Those which apply **when breathing is present and there are no convulsions.**

4.—Those which apply **when convulsions are present—Fits.**

I. TREATMENT IN ALL CASES.

1.—Undo all tight clothing about the neck, chest and waist.

2.—Ensure an abundance of pure air. Open windows and doors; keep back a crowd; remove from harmful gases or impure atmosphere.

3.—Arrest hæmorrhage when apparent; attending to minor injuries is less important than treating the unconscious state.

4.—Obtain a doctor's help as soon as possible.

5.—**Carefully examine:—**

(*a*) **The patient** for signs of injury. Depend entirely on your powers of observation, as, if insensibility is complete, the patient can give no information; and if insensibility is incomplete, information given by the patient is apt to be confused and therefore unreliable.

(*b*) **The surroundings** for any possible clues.

6.—**Give no food or fluids whatever by the mouth while the patient is insensible.**

7.—**Do not assume that a person is insensible as the result of drink merely because the breath or mouth smells of alcohol.** Frequently when people are feeling ill they take or are given alcoholic stimulants, after which they may become insensible, not from the drink, but from the cause that induced them to take it; for example, faintness coming on, effects of poisoning, etc. Even if drink is the actual cause of insensibility, it must be borne in mind that the patient is therefore in a very dangerous state, and must be treated accordingly.

8.—**Unless unavoidable, never leave the patient until you have placed him in charge of a responsible person.**

9.—**Should the spine or an important bone of the upper or the lower limb be fractured, it must be steadied and maintained at rest as soon as possible.** Should the insensibility be

prolonged, the patient may be removed **in a recumbent position** to shelter, provided that the broken bone is adequately supported.

10.—**On return to consciousness** water may be given to drink. If the pulse is feeble give warm tea or coffee, provided hæmorrhage, either internal or external, is not apparent or suspected. A desire to sleep should be encouraged, except in cases of narcotic poisoning, a condition that may generally be recognised by the history of the case, and also by the pupils of the eyes being minutely contracted (pin-point pupils).

II. WHEN BREATHING IS ABSENT—ASPHYXIA.

1.—**Do not assume death is present because signs of life are absent.** Persons whose breathing has been suspended for even ten or fifteen minutes, owing to complete immersion in water or to other causes, have been restored by artificial means.

2.—**Afford the treatment applicable to all cases of insensibility.**

3.—**Ensure that breathing is possible,** *i.e.*, that the air passages are not obstructed, that pressure does not prevent the necessary expansion of the chest, and that there is abundance of pure air. A continuous want of pure air produces a condition

known as asphyxia, and may be brought about as follows:—

I. Obstruction of the air passages.

(*a*) By drowning.

(*b*) By pressure from outside: Strangulation, hanging, smothering.

(*c*) By a foreign body (*e.g.*, a piece of meat, false teeth, etc.) in the throat: Choking.

(*d*) By swelling of the tissues of the throat: Inflammation, scald of the throat, poisoning by a corrosive, or stings of insects.

II. Inhaling poisonous gases. By coal gas (as used in the house), producer gas, smoke, fumes from a charcoal or coke fire, sewer gas, lime-kiln gas, carbonic acid gas.

III. Pressure on the chest, as when crushed by sand or debris, or by a crowd.

IV. Nervous affections, as the result of narcotic and certain other poisons, collapse, electric shock, or stroke by lightning.

To ensure the possibility of breathing, act as follows:—

Strangulation.

Cut and remove the band constricting the throat.

Hanging.

Do not wait for a policeman: grasp the lower limbs and raise the body to take the tension off the rope; cut the rope, and free the neck.

Choking.

To dislodge the obstruction thump the back hard between the shoulder-blades. If this is unsuccessful open the mouth, forcibly if need be; pass two fingers along the tongue right to the back of the throat and try to pull up the foreign body. If this is impossible push it back into the gullet. If vomiting results immediately turn the head on one side.

Swelling of the Tissues of the Throat.

If possible, lay the patient before the fire. Apply a sponge, piece of flannel or other cloth, wrung out of very hot water, to the front of the neck, from the chin to the top of the breast-bone. If breathing has not ceased or has been restored, give ice to suck, or failing ice, cold water to drink. Also give oil (not lamp or machine oil), a dessert-spoonful at a time.

Suffocation by Smoke or Gases.

Remove the patient into the fresh air. Before entering a building full of smoke tie a handkerchief, wet if possible, over the nose and mouth. Keep low, or even crawl, whilst in a room full of smoke or gas that rises. Some gases, such as the fumes of petrol, are heavier than air, and consequently keep near the ground. In rescuing a patient from heavy gas, move in an upright position. Opportunities of learning whether poisonous gases used in one's neighbourhood

are lighter or heavier than air should be sought and seized. Whatever the nature of the gas is, endeavour to let in fresh air by opening doors and windows. In the case of producer gas, inhalation of oxygen from a cylinder will be necessary.

Electric Shock.

Electric current is conveyed by a cable, wire, rail, or bar, called the "Positive," and returns to the source of supply by another cable, wire, rail, or bar, called the "Negative," or through the earth. In the case of an electric railway, the current is generally conveyed by an insulated rail called the third (or live) rail, and returns through the running rails or an insulated rail called the fourth rail, which is between the two running rails; and in the case of an electric tramway it is frequently conveyed by an overhead conductor or trolley wire, and returned through the running rails.

Through contact with a "positive" the shock may be so severe as to cause insensibility, and the sufferer will be unable to extricate himself, and must be liberated with all possible speed. As it is generally impossible or inexpedient to switch off the current, some other method must usually be adopted; but precautions must be taken, or else the person rendering assistance will himself receive a dangerous, or even fatal shock.

To liberate the sufferer from contact :—

(*a*) **Insulate yourself from the earth** by standing on an "insulator" or "non-conductor," that is, a body which resists the current. Amongst such bodies are indiarubber, linoleum, dry glass, dry bricks, dry silk, dry cloth, dry wood and dry hay or straw.

(*b*) **Protect your hands from contact with the sufferer and the electric medium** by covering them with an insulator. Although indiarubber is probably the best insulator, do not waste time in running for indiarubber gloves, but use dry articles of clothing; an indiarubber tobacco pouch, or cap, or folded newspaper, would serve to protect the hands in an emergency. If no means of insulating the hands are at hand, an attempt may be made to drag the sufferer away by means of a loop of dry rope or a crooked stick; an umbrella is not safe because the metal ribs would act as conductors of electricity, and it is not infrequently the case that the "stick" of the umbrella is a metal tube.

(*c*) **Pull the sufferer away from contact.** Care should be taken to avoid touching with naked hands the sufferer's hands, wet clothing, or boots if the soles are nailed.

The armpits should be avoided, as perspiration usually makes the clothing damp there.

4.—**Immediately breathing is possible, whatever the cause of cessation of breathing has been, do artificial respiration** by Schäfer's method as follows:—

(*a*) Lay the patient in a prone position (*i.e.*, back upwards), with his head turned to one side, so as to keep his nose and mouth away from the ground. No pad is to be placed under the patient, nor need the tongue be drawn out, as it will fall naturally.

To turn the patient to the prone position proceed as follows:—If standing at the right side of the patient, cross his left leg over his right leg; see that both arms are down at his sides; place your left hand at the side of the patient's right cheek, and with your right hand grasp the clothing at the left hip joint; pull smartly over.

(*b*) Kneel at one side of or across the patient, facing his head, and place the palms of your hands on his lowest ribs, one at each side, the thumbs parallel to each other, about two inches apart, in the small of the back. Keeping your arms quite straight and leaning your body forward, slowly apply firm but not violent pressure straight down-

wards upon the back and lower part of the chest, thus driving air out and producing

FIG. 56.

FIG. 57.

expiration (Fig. 56). This movement should occupy three seconds. Draw back your body somewhat more rapidly and relax the pressure, but do not remove your hands; this produces inspiration (Fig. 57). This movement should occupy two seconds.

(*c*) Alternate these movements by a rhythmic swaying backwards and forwards of your body from the knee joints, twelve times a minute, persevering until respiration is restored, or a doctor pronounces life to be extinct.

Should any signs of congestion be seen in the patient's face, immediately change the method of artificial respiration to Silvester's, as follows:—

1.—**Adjust the patient's position.**—Without wasting a moment, place the patient on his back on a flat surface, inclined if possible from the feet upwards. Remove all tight clothing from about the neck and chest, and bare the front of the body as far as the pit of the stomach; unfasten the braces and the top button of trousers in men, and the corsets in women. Raise and support the shoulders on a small, firm cushion or folded article of dress placed under the shoulder-blades.

2.—**Maintain a free entrance of air into the wind-pipe.**—An assistant must draw forward the patient's tongue as far as possible, and secure it in

that position. In the absence of forceps a tie (or other) clip may answer the purpose. If this is not done there is great danger of obstruction of the wind-pipe (compare Figs. 58 and 59).

3.—Imitate the movements of breathing.

Induce Inspiration.—Kneel at a convenient distance behind the patient's head, and, grasping his

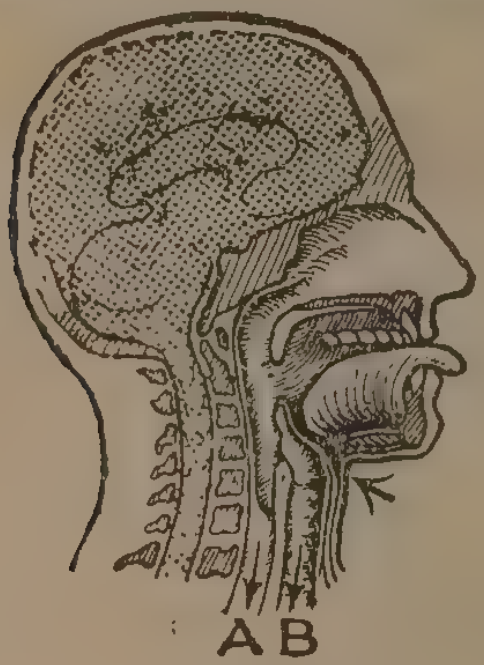


FIG. 58.
A. GULLET.

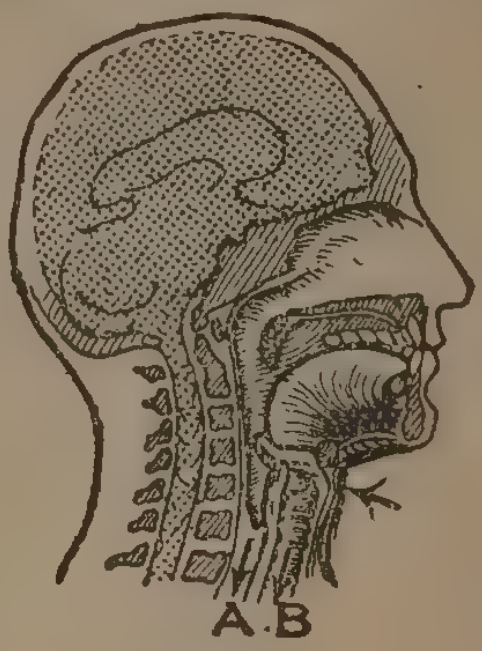


FIG. 59.
B. WINDPIPE.

forearms just below the elbow, draw the arms upwards, outwards, and towards you, with a sweeping movement, making the elbows touch the ground (Fig. 60). The cavity of the chest is thus enlarged, and air is drawn into the lungs.

Induce expiration.—Bring the patient's flexed arms

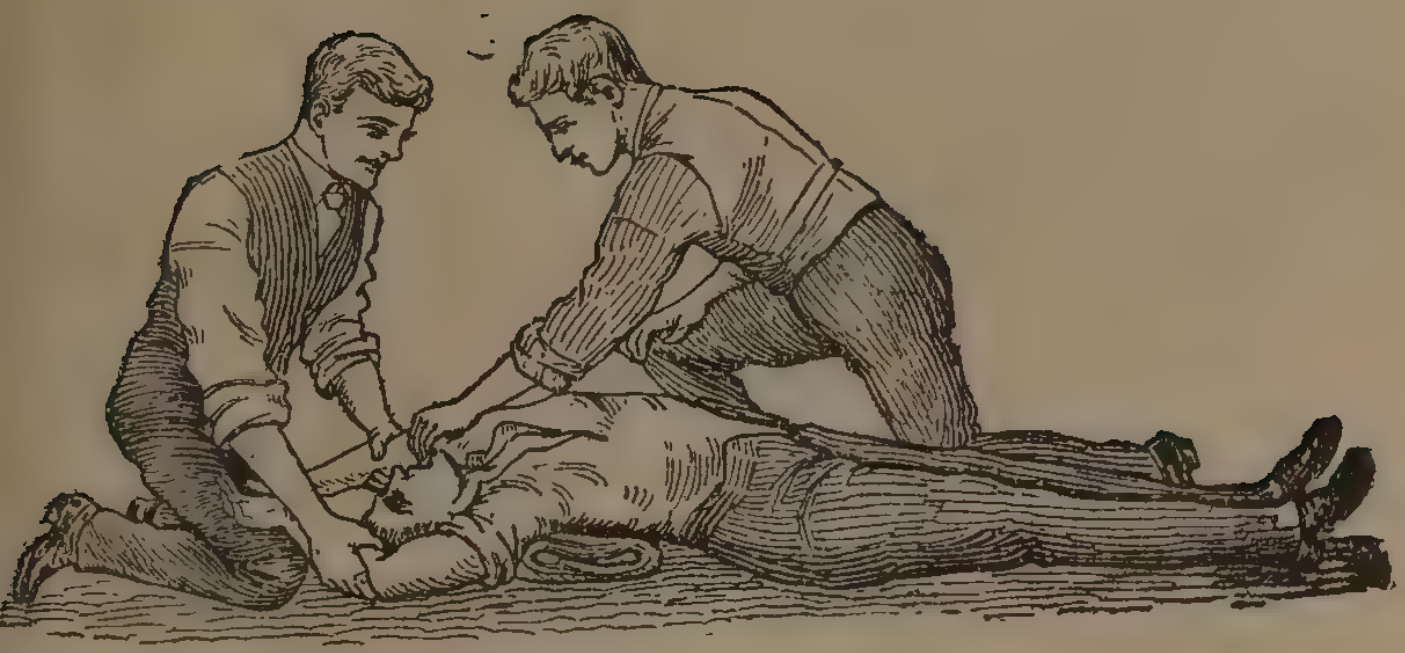


FIG. 60. INSPIRATION.

FIG. 61. EXPIRATION.

slowly forward, downwards and inwards, press the arms and elbows firmly on the chest on each side of the breast-bone (Fig. 61). By this means air is expelled from the lungs.

Repeat these movements alternately, deliberately, and perseveringly about fifteen times a minute.

Continue this method for ten minutes, then revert to Schäfer's, which may be continued until congestion is again noticed, upon which Silvester's method should be resumed for another ten minutes.

When from any cause the above methods cannot be carried out, *Laborde's method* of artificial respiration should be tried. It is especially useful in suffocated children, or when the ribs are broken.

The patient is placed on his back or side; the mouth cleared; the tongue is seized—using a handkerchief or something to prevent it slipping from the fingers—the lower jaw depressed; the tongue is pulled forward and held for two seconds in that position, then allowed to recede into the mouth. These movements should be repeated about fifteen times a minute.

Artificial respiration by either method must be done perseveringly. Success may result even after two hours. When natural breathing begins, regulate the artificial respiration to correspond with it.

Excite respiration.—Whilst artifical respiration is being done, other useful steps may be employed,

such as applying smelling salts or snuff to the nostrils.

Promote circulation and warmth after natural breathing has been restored. Wrap the patient in dry blankets or other covering, and rub the limbs energetically towards the heart. Promote warmth by hot flannels, hot-water bottles or hot bricks (wrapped in flannel) applied to the feet, to the limbs and body. When the power of swallowing has returned give hot tea, coffee, or meat extract. The patient should be kept in bed and encouraged to go to sleep. Large poultices or fomentations applied to the front and back of the chest will serve to assist breathing.

Watch the patient carefully for some time to see that the breathing does not fail ; if it does, at once begin artificial respiration again.

III. WHEN BREATHING IS PRESENT AND THERE ARE NO CONVULSIONS.

1.—**Prevent from falling** a patient about to lose consciousness, and lay him gently on the ground.

2.—**Afford the treatment applicable to all cases of insensibility.**

3.—**IF THE FACE IS PALE, lay the patient on his back with his head low and turned on one side.** The head must be on a level with, or lower than, the body. Raise the feet ;

this is best done when the patient is in bed by raising the foot of the bedstead. A pale face is a sign of an insufficient supply of blood to the head, a condition that may arise as follows :—

(*a*) Concussion of the brain (stunning).

The patient may be stunned by a blow or fall on the head, or by a fall on the feet or lower part of the spine. He may be in a state of stupor for a short time only, and quickly regain consciousness, or stupor may be prolonged and may deepen into coma.

In both instances there is a grave risk that a structure within the cranium has been injured, and that a most serious state of insensibility may develop later. (See Fracture of the Cranium, page 49.) A caution should therefore be given to a patient who has lost consciousness even for only a moment after an injury to the head, not to resume physical or mental activity without the consent of a doctor. Rest in bed for some hours is a very wise precaution.

(*b*) Shock, fainting (syncope) and collapse.

These conditions practically differ from each other only in degree. The causes are :—

Physical.—Injury in the region of the abdomen, extensive wounds and burns, fractures, lacerated wounds, severe crush or hæmorrhage.

Mental.—Fright, anticipation of injury, and sudden bad news, or sometimes sudden removal of fear and anxiety after prolonged suspense.

Constitutional.—Heart weakness, which may be aggravated by tight clothing, fatigue, want of food, or being in a close or crowded room.

Poisoning.—Alcohol, and many other forms of poisons.

Special Treatment.

Attend to injuries; ensure that there is no pressure upon the heart due directly to tight clothing about the chest or indirectly to tight clothing about the abdomen; remove from a close or crowded room; use encouraging words.

An attendant danger of the condition of collapse is the liability to sudden relapse after a temporary improvement, and the utmost care and watchfulness must be exercised to maintain the heat of the body and to guard against failure of the heart and lungs. Cover the patient with extra clothing, rugs or blankets, and get him to bed in a well-ventilated room as soon as possible. Apply warmth to the feet and to the pit of the stomach by hot-water bottles or hot flannels. Test the heat of these with the bare elbow before applying them. If the patient can swallow, and there is no fear of uncontrollable hæmorrhage, hot drinks, such as milk, tea or coffee, to either of which sugar should be added, as it aids in promoting warmth, or a teaspoonful of sal volatile in half a tumbler of water, may be given in sips; but first test ability to swallow by

introducing a teaspoonful of cold water at a time between the gums and the cheek. Smelling salts may be held to the nose. Sprinkling the face with hot and cold water alternately, warmth applied to the pit of the stomach and over the heart, and vigorous friction of the limbs upwards have a stimulating effect.

If fainting has been caused by hæmorrhage, it has, by reducing the force of the heart's beat, probably afforded a chance of saving the patient's life. It ought to be remembered that a wound, however severe, will not bleed to any marked extent while the action of the heart is feeble, and it is therefore not sufficient to satisfy oneself that there is no bleeding actually going on, but the proper remedies must be applied to prevent bleeding, which may come on as the patient begins to regain consciousness. The proper course in such cases is to examine the wound to see if blood is still flowing from it; if so, at once arrest the hæmorrhage. If blood is not flowing, at once attempt to stimulate the heart by smelling-salts held to the nostrils, warmth to the heart, and tightly bandaging the uninjured limbs. If these remedies prove successful, as would be shown by return of colour to the lips and face, at once prevent further loss of blood from the wound.

If want of nourishment has been the cause of fainting or collapse, give food sparingly at first.

4.—**WHEN THE FACE IS CONGESTED** (red, blue or dusky) the patient is probably suffering from **Apoplexy** (disease of the brain), **Compression** (injury to the brain) or **Heatstroke** or **Sunstroke.**

Apoplexy usually occurs in elderly people, and no signs of injury are necessarily present.

Compression of the brain may result from the same causes as produce Concussion; in fact, Compression is frequently preceded by Concussion. Signs of injury are usually present.

In both conditions there is congestion in the brain; the face is flushed; the breathing stertorous; one side of the body is more limp than the other, and the pupil of one eye is larger than that of the other; the temperature of the body is generally raised.

SPECIAL TREATMENT FOR APOPLEXY AND COMPRESSION OF THE BRAIN.

(a) **Lay the patient on his back, raise the head and shoulders, turn the head on one side.**

(b) **Promote warmth in the lower part of the body** by applying hot-water bottles to the abdomen and lower limbs. As the patient is insensitive to pain, care must be taken lest he be burnt by the bottles; they should be wrapped in flannel, and their heat tested with the bare elbow after allowing time for the heat to come through the flannel.

(*c*) **Apply ice or cold water to the head continuously.** Merely sprinkling the head with cold water acts as a stimulant to the circulation in the head, and does more harm than good.

(*d*) **Afford complete rest.** Unless absolutely necessary, do not move the patient from where he fell.

Sunstroke or Heatstroke.

Sunstroke or Heatstroke may be caused by exposure to the rays of the sun during a march in very hot weather when heavily burdened, or to great heat, as in the stoke-hole of a steamer, especially in the tropics. The patient develops sickness, faintness, giddiness, thirst, and difficulty in breathing. The skin becomes dry and burning, the face very flushed, and the pulse quick and bounding. A very high temperature, stertorous (snoring) breathing and insensibility (either stupor or coma) may ensue. In Sunstroke or Heatstroke congestion extends not only to the brain but to the whole of the nervous chain along the entire length of the spinal column, consequently the area to be relieved is greater, and different treatment is necessary.

Special Treatment.

(*a*) **Remove the patient to a cool, shady spot, and strip him to the waist.**

(*b*) **Lay him down with the head and shoulders well raised.**

(*c*) **Fan him vigorously.**

(*d*) **Apply ice bags or cold water** freely to the head, neck and spine, and maintain until the symptoms subside.

IV. WHEN CONVULSIONS ARE PRESENT.—FITS.

Convulsions are involuntary contractions of the muscles of the body; they may be limited to the limbs on one side of the body or may be general. They may be due to—

(*a*) *Constitutional causes*: Epilepsy, hysteria, teething and intestinal irritation (stomach troubles).

(*b*) *Poisoning*: By strychnine, prussic acid, fungi or berries.

1.—Afford the treatment applicable to all cases of insensibility.

2.—If breathing is seen to be failing, do artificial respiration without waiting until it actually ceases.

3.—Endeavour to ascertain the cause of the convulsions.

(*a*) **Epilepsy** may occur in persons of any age, but usually occurs in young adults. The patient falls to the ground, sometimes with a scream, and passes into a state of convulsion, throwing his limbs about.

SPECIAL TREATMENT.

i. Support the patient's head, and after wrapping a piece of wood, or any other hard material, in a handkerchief, hold it in his mouth to prevent biting the tongue.

ii. Do not forcibly restrain the patient's limbs; prevent him from hurting himself by pulling him away from a source of danger, such as machinery, a wall or fireplace. Light pieces of furniture should be pushed out of the way.

(*b*) **If the patient is resting on his heels and head with the back arched,** strychnine poisoning is the cause. Give an emetic between the fits and do artificial respiration.

(*c*) **If the history points to stomach trouble,** as caused by fungi or berries, give a tablespoonful of castor oil between the fits, and keep the patient warm in bed with hot-water bottles.

(*d*) **Infantile convulsions** will be indicated by the age of the patient. Spasm of the muscles of the limbs and trunk, blueness of the face, insensibility, more or less complete, and occasionally squinting, suspended respiration and froth at the mouth are the prominent signs.

TREATMENT.

i. Support the child in a warm bath slightly above the temperature of the body (98 degrees), so that the water reaches to the

middle of the trunk, for fifteen to twenty minutes.

ii. Keep a sponge frequently dipped in cold water on the top of the head as long as the child is in the bath.

(*e*) **In Hysterical Fits (Hysteria)** the patient, usually a young girl, in consequence of mental excitement, suddenly loses command of her feelings and actions. She subsides on a couch or in some comfortable position, throws herself about, grinding her teeth, clenching her fists, shaking her hair loose; she clutches at anyone or anything near her, kicks, cries and laughs alternately. The eyeballs may be turned upwards, and the eyelids opened and shut rapidly. At times froth appears at the lips, and other irregular symptoms may develop. Complete insensibility is not present.

i. Avoid sympathy with the patient, and speak firmly to her.

ii. Threaten her with a cold water douche, and if she persists in her "fit," sprinkle her with cold water.

iii. Apply a mustard leaf at the back of the neck. Medical treatment is necessary to cure the condition of mind and body which gives rise to hysterical attacks.

6.—**Encourage sleep,** but carefully watch the breathing.

QUESTIONS ON CHAPTER V.

The numerals indicate the pages where the answers may be found.

	PAGE
How are the movements and functions of the body regulated?	123
Of what is the cerebro-spinal system made up? ...	123, 124
What is the brain?	123
What is the spinal cord?	123
What are nerves?	124
Explain the sympathetic system	124
Explain the respiratory system	124, 125
Explain the acts of respiration	125
How are the enlargement and diminution of the chest effected?	125 127
What are the degrees of insensibility?	127
Do the pupils of the eyes respond to light in all degrees?	127, 128
What are the objects of treatment of insensibility? ...	128
Under what heads do the rules for treatment fall? ...	128
State the rules which apply in all cases of insensibility	128-130
State shortly the rules which apply when breathing is absent	130–135
How may asphyxia be brought about?	131
What special steps must be taken in strangulation, hanging, choking, swelling of the tissues of the throat and suffocation by smoke or gases?	131–133
How would you liberate a sufferer from contact with an electric positive?	134
What would you do when the sufferer was removed from contact?...	135
Mention three systems of artificial respiration ...	135-140
Describe them	135–140

PAGE

What steps should be taken during and after doing artificial respiration? 140, 141
What is the principal sign to notice in an insensible person when breathing is present and there are no convulsions? 141, 145
In what position should the patient be when the face is pale? 141
How may insensibility with a pale face be caused? 142, 143
What is concussion of the brain? 142
What caution should be given to a patient who has lost consciousness, even for a moment, after an injury to the head? 142
State causes of shock, fainting and collapse ... 142, 143
State the special treatment of these conditions 143
State an attendant danger of the condition of collapse, and the provisions that should be made to guard against it 143, 144
What would you do if hæmorrhage had been the cause of fainting? 144
In what position should a patient be when the face is congested? 145
What conditions caused the face to become congested? 145
State the special treatment for apoplexy and compression of the brain 145, 146
State signs, symptoms and treatment of sunstroke or heatstroke 146, 147
What are convulsions? 147
How may convulsions be caused? 147
State general rules for treatment of fits 147, 148
State the treatment for infantile convulsions ... 148, 149
State the treatment for hysterical fits 149

Chapter VI.

POISONING.

Poisons taken by the mouth may be classified according to their treatment under two main heads :—

I.—THOSE WHICH DO NOT STAIN THE LIPS AND MOUTH, and in the treatment of which an EMETIC is to be given. These may be :—

(*a*) **Narcotics :—**

i. *Opium and its preparations*, Morphia, Laudanum, Paregoric, Chlorodyne, Syrup of Poppies and various soothing drinks and cordials. These cause a tendency to go to sleep, which continues until sleep becomes deep and breathing stertorous ; the pupils of the eyes become minutely contracted (pin-point pupils).

ii. *Other Narcotics* are Chloral, Veronal, Sulphonal, Trional, Chloroform, Alcohol (including Methylated Spirit). The signs are profound sleep and muttering delirium, with a tendency to blueness of the face.

(*b*) **Convulsants.**—Strychnine, Prussic Acid, Cyanide of Potassium, Belladonna (deadly nightshade plant), and several other varieties of plants, such as laburnum seeds, etc.

These give rise to convulsions, delirium, failure of respiration and collapse.

(*c*) **Irritants.**—Arsenic, Phosphorus (contained in rat poison and lucifer matches), Tartar Emetic, Corrosive Sublimate and Iodine, which cause a metallic taste in the mouth and a burning pain in the mouth, throat and stomach.

Decomposing meat, fish or fruit, and poisonous fungi (often mistaken for mushrooms). Suspicion of these poisons should be directed to cases where several persons who have partaken of the same food develop similar signs and symptoms, such as vomiting, colicky pains and diarrhœa.

II.—THOSE WHICH BURN OR STAIN THE LIPS AND MOUTH, and in the treatment of which NO emetic is to be given.

These may be:—

(*a*) **Corrosive Acids,** such as Nitric Acid (Aqua fortis), Sulphuric Acid (Oil of Vitriol), Hydrochloric, or Muriatic, Acid (Spirits of Salt), strong Carbolic Acid (Phenol), Oxalic Acid, which is contained in oxalate of potash, salts of sorrel, salts of lemon and some polishing pastes.

(*b*) **Corrosive Alkalies,** such as Caustic Potash, Caustic Soda and Ammonia.

General Rules for the Treatment of Poisoning.

1.—**Send for a doctor at once,** stating what has occurred, and if possible the name of the poison.

2.—**EXCEPT when the lips and mouth are stained or burned by an acid or alkali, promptly give an EMETIC**—that is, make the patient vomit, by giving either :—

(*a*) *Mustard*—a table-spoonful in a tumblerful (½-pint) of lukewarm water, and repeated until vomiting occurs, or

(*b*) *Salt*—two table-spoonfuls in a tumblerful (½-pint) of lukewarm water, and repeated until vomiting occurs.

If vomiting is retarded, putting the two fingers to the back of the throat may sometimes hasten it.

3.—**If the lips and mouth are stained or burned give NO emetic, but—**

(*a*) If an Acid is known to be the poison, at once give an Alkali, such as lime-water, or a table-spoonful of whitening, chalk, magnesia, or wall plaster in a tumblerful (½-pint) of water.

(*b*) If an Alkali is known to be the poison, at once give an Acid, such as vinegar or lemon juice diluted with an equal quantity of water.

4.—In all cases when the patient is not insensible, give Milk, Raw Eggs beaten up with milk or water, Cream and Flour beaten up together, Animal or Vegetable Oil (except in Phosphorus poisoning), and Tea.

Olive, Salad, and Cod-liver Oil, or oil such as that in which sardines are preserved, may be given; mineral oils such as ordinary paraffin are unsuitable. Oil is soothing, and is therefore especially useful in poisoning by Acids, Alkalies and such substances as Arsenic and Corrosive Sublimate. Demulcent drinks, such as barley water or thin gruel, act in the same manner, and are free from danger in cases of Phosphorus poisoning.

These may be given either before or after the emetic if the poison calls for one.

Strong Tea acts as a neutraliser of many poisons, and is always safe. A handful of tea should be thrown into a kettle and boiled.

5.—When a person has swallowed poison and threatens to go to sleep, keep him awake by walking him about and slapping his face, neck and chest with a wet towel. Strong black coffee may be given to drink. Slapping the soles of the feet may also be tried. When the poison taken is known to be Opium or one of its preparations, give ten grains of permanganate of potash in a pint of water, and repeat in half-an-hour; or three table-spoonsful of Condy's

fluid in a pint of water, and repeat the dose in half-an-hour.

6.—If the throat is so swollen as to threaten obstruction to the air passage, apply hot flannels or poultices to the front of the neck, and give frequent sips of cold drinks.

7.—Apply artificial respiration if breathing cannot be discerned or is failing.

8.—Treat shock and collapse.

9.—Preserve any vomited matter, food or other substance suspected of being the poison. Do not wash vessels which may have contained the poison, but carefully guard them.

Certain poisons require special treatment, and a few of the commoner of these are mentioned below with their treatment.

Carbolic Acid.

The odour of the breath will aid in the detection of this poison; the lips and mouth are usually stained white, and several nervous symptoms come on.

1.—Give milk, to a pint of which half an ounce of Epsom Salts has been added.

2.—Treat according to the general rules.

Prussic Acid and Cyanide of Potassium.

The action of these poisons is extremely rapid. Giddiness, staggering, insensibility accompanied by

panting respiration, profound collapse and possibly convulsions are the general signs, and in addition a smell of bitter almonds is often present.

1.—If the patient can swallow, give alcoholic stimulants freely.

2.—Apply artificial respiration, even if breathing has not ceased.

3.—Dash cold water on the head and spine continuously.

4.—As patient shows signs of recovering, treat shock and collapse.

Poisonous Meat, Fish and Fungi.

The signs and symptoms are vomiting and purging diarrhœa), colic, headache, great weakness, raised temperature and a quick pulse.

1.—Give an emetic.

2.—When the emetic has acted, give castor oil.

3.—Treat collapse.

Strychnine (contained in some Rat Poisons).

The signs and symptoms are a feeling of suffocation, livid features, and convulsions, during which the patient rests on his head and feet, and the body is arched.

1.—Give an emetic if the patient can swallow.

2.—Apply artificial respiration if possible, whether breathing has ceased or not.

Alcohol.

1.—Give an emetic if the patient can swallow.

2.—Treat collapse by keeping the patient warm, etc.

Corrosive Sublimate (Perchloride of Mercury).

1.—Give white of eggs mixed with water, in unlimited quantities.

2.—General Rules.

Iodine.

1.—Give starch and water freely.

2.—General Rules.

QUESTIONS ON CHAPTER VI.

The numerals indicate the pages where the answers may be found.

PAGE

Under what two main heads are poisons classified? 152, 153
State the sub-divisions of narcotics, together with the names of the poisons falling under each 152
Enumerate the convulsants and state their signs and symptoms 152, 153
Enumerate the irritants and state their signs and symptoms 153
Enumerate the corrosive acids 153
Enumerate the corrosive alkalies 153
State shortly the general rules for the treatment of poisoning 154–156
How would you make a patient vomit? 154
What would you give for poisoning by a corrosive acid? 154
What would you give for poisoning by a corrosive alkali? 154
State the signs, symptoms and treatment of carbolic acid poisoning 156
State the signs, symptoms and treatment of poisoning by Prussic acid or cyanide of potassium... ... 156, 157
State the signs, symptoms and treatment of poisoning by poisonous meat, fish or fungi 157
State the signs, symptoms and treatment of poisoning by strychnine 157
What would you do in the case of alcoholic poisoning? 158
What would you do in the case of poisoning by corrosive sublimate? 158
What would you do in the case of poisoning by iodine? 158

Chapter VII.

BANDAGING.

The Triangular Bandage has been described in Chapter II. It may be applied to keep a dressing on a wound, burn or scald of any part of the body, or for an injury of a joint.

For the Scalp (Fig. 62). Fold a hem about 1½ inches deep along the base of a bandage; place the bandage on the head so that the hem lies on the forehead **close down to the eyebrows,** and the point hangs down at the back; carry the two ends round the head **above** the ears and tie them on the forehead; steady the head with one hand and with the other draw the point of the bandage downwards; then turn it up and pin it on to the bandage on the top of the head.

Fig. 62

For the Forehead, Side of the Head, Eye, Cheek, and for any part of the body that is round (as the arm or thigh, etc.), the narrow bandage

should be used, its centre being placed over the dressing, and the ends being carried round the head or limb, as the case may be, and tied over the wound.

For the Shoulder (Fig. 63). Place the centre of a bandage on the shoulder, with the point running

FIG. 63.

FIG. 64.

up the side of the neck ; fold a hem along the base ; carry the ends round the middle of the arm and tie them. Place one end of a broad bandage over the point of the first bandage and sling the arm by carrying the other end over the sound shoulder and

tying the ends at the side of the neck ; turn down the point of the first bandage, draw it tight and pin it.

For the Hip (Fig. 64). Tie a narrow bandage round the body above the haunch bones, with the knot on the injured side. Fold a hem according to the size of the patient along the base of a second bandage ; place its centre over the dressing, carry the ends round the thigh and tie them ; then carry the point up under the

FIG. 65.

FIG. 66.

first bandage, turn it down over the knot and pin it.

For the Hand when the fingers are extended (Fig. 65). Fold a hem along the base of a bandage ; place the wrist on the hem with the fingers towards the point ; then bring the point over the wrist, pass the ends round the wrist, cross and tie them ;

bring the point over the knot and pin it to the bandage on the hand.

For the Foot (Fig. 66). Place the foot on the centre of the bandage with the toes towards the point; draw up the point over the instep, bring the ends forward and cross them; pass the ends round the

FIG. 67*a*.

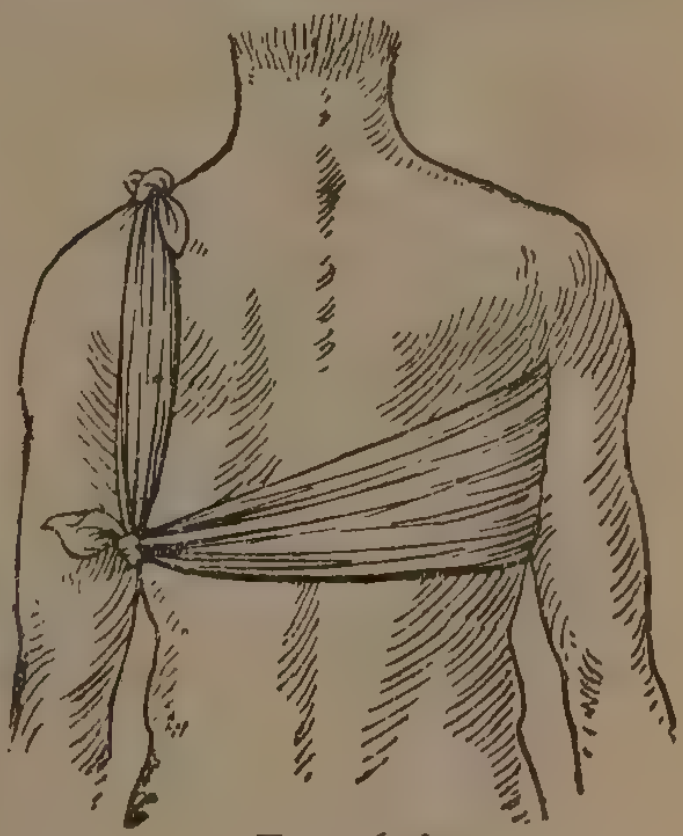


FIG. 67*b*.

instep and tie them. Draw the point forward and pin it to the bandage on the instep.

For the Front of the Chest (Figs. 67*a* and 67*b*). Place the middle of the bandage over the dressing with the point over the shoulder on the same side; carry the ends round the waist and tie them;

FIG. 68.

then draw the point over the shoulder and tie it to one of the ends. A hem along the base of the bandage is often useful.

For the Back. The bandage is applied as the foregoing, except that it is begun at the back.

For the Knee. Fold a narrow hem along the base of a bandage; lay the point on the thigh and the middle of the base just below the knee-cap; cross the ends first behind the knee, then over the thigh and tie them (Fig. 68). Bring the point down and pin it to the base.

For the Elbow. Fold a narrow hem along the base of a bandage; lay the point on the back of the arm and the middle of the base on the back of the forearm; cross the ends first in front of the elbow, then over the arm and tie them (Fig. 69).

For the Fingers or Toes wrap a strip of calico or linen round and round the part; split the free end, and secure it round the wrist or ankle.

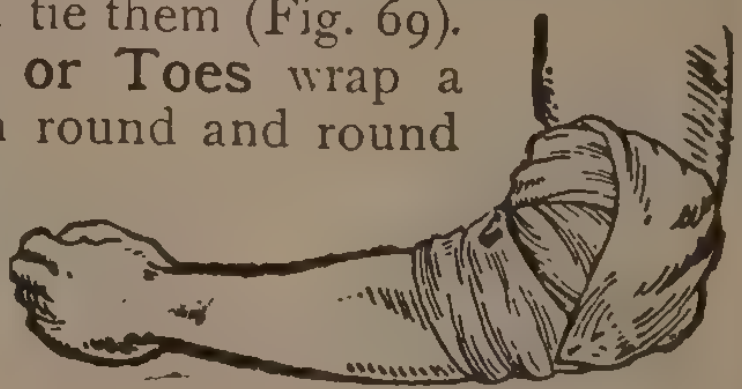


FIG. 69.

Chapter VIII.

METHODS OF CARRYING.

The Two-Handed Seat.

This seat may be used to carry a helpless patient.

Fig. 70.

1.—Two bearers face each other and stoop, one on each side of the patient. Each bearer passes his fore-arm nearest to the patient's head under his back just

below the shoulders, and, if possible, takes hold of his clothing. They slightly raise the patient's back, and then pass their other forearms under the middle of his thighs (Fig. 70), and clasp their hands, the bearer on the left of the patient with his palm upwards, and holding a folded handkerchief to prevent hurting by the finger nails; the bearer on the right of the patient with his palm downwards, as shown in Fig. 71.

FIG. 71.

2.—The bearers rise together and step off, the right-hand bearer with the right foot, and the left-hand bearer with the left foot (Fig. 72).

THE HUMAN STRETCHER.

This is a modification of the two-handed seat, which is useful for lifting and carrying a patient in the recumbent or semi-recumbent position.

1.—Two bearers face each other and stoop, one on each side of the patient. They clasp their left hands beneath the patient's hips in the manner of shaking hands (Fig. 73).

2.—The bearer on the patient's left passes his right hand and forearm under the patient's head, neck and shoulders.

FIG. 72.

3.—The bearer on the right passes his right hand and forearm under the patient's legs.

4.—The bearers rise together and carry the patient, feet foremost, by short side paces (Fig. 74).

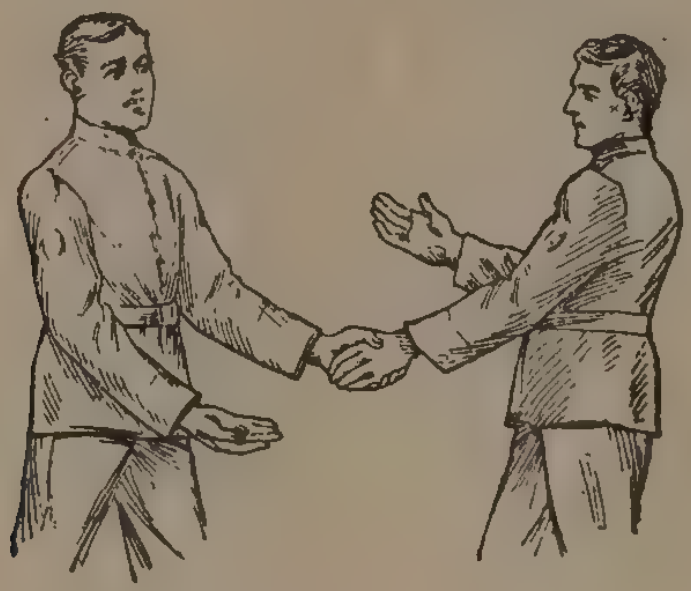


FIG. 73.

THE THREE-HANDED SEAT.

This seat is useful for carrying a patient and supporting either of his lower limbs, when he is able to use his upper limbs.

1.—Two bearers face each other behind the patient. For supporting the left limb the bearer to the patient's right grasps his own left forearm with his right hand, and the other bearer's right forearm with his left hand. The bearer to the left grasps the first bearer's right wrist with his right hand (Fig. 75). This leaves his left hand free to support the patient's left leg. For

FIG. 74.

the patient's right lower limb follow the same direc tions, substituting "right" for "left" and "left" for "right." The bearers stoop down.

2.—The patient places one arm round the neck of each bearer and sits on their hands.

3.—The bearers rise together and step off, the

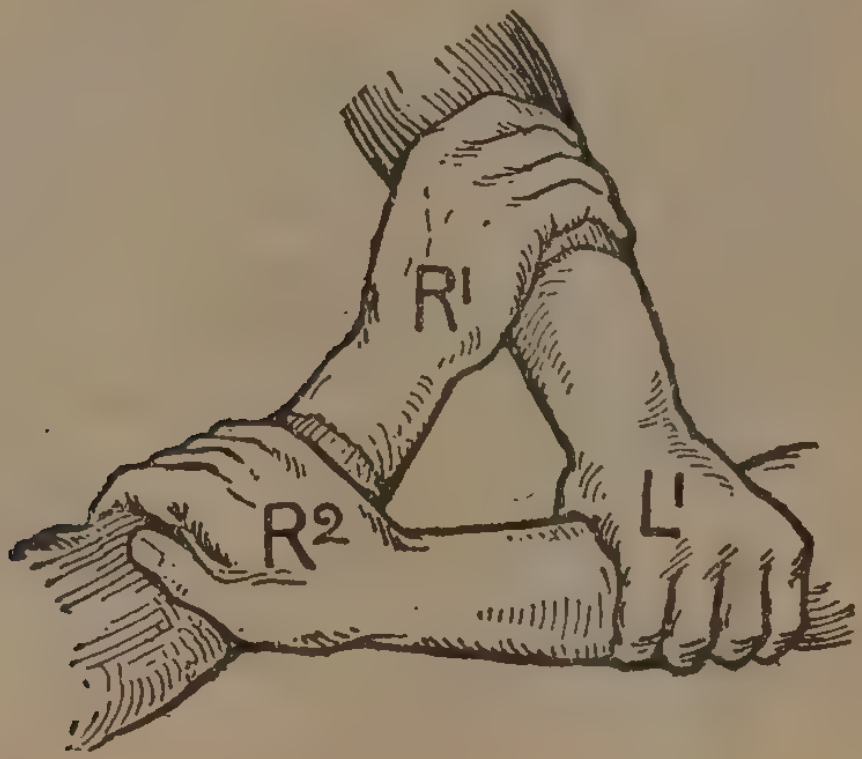


FIG. 75.

right-hand bearer with the right foot, and the left-hand bearer with the left foot.

THE FOUR-HANDED SEAT.

This seat is used when the patient can assist the bearers and use his arms.

1.—Two bearers face each other behind the patient and grasp their left wrists with their right hands and each other's right wrists with their left hands (Fig. 76), and stoop down.

2.—The patient sits on the hands and places one arm round the neck of each bearer.

3.—The bearers rise together and step off, the

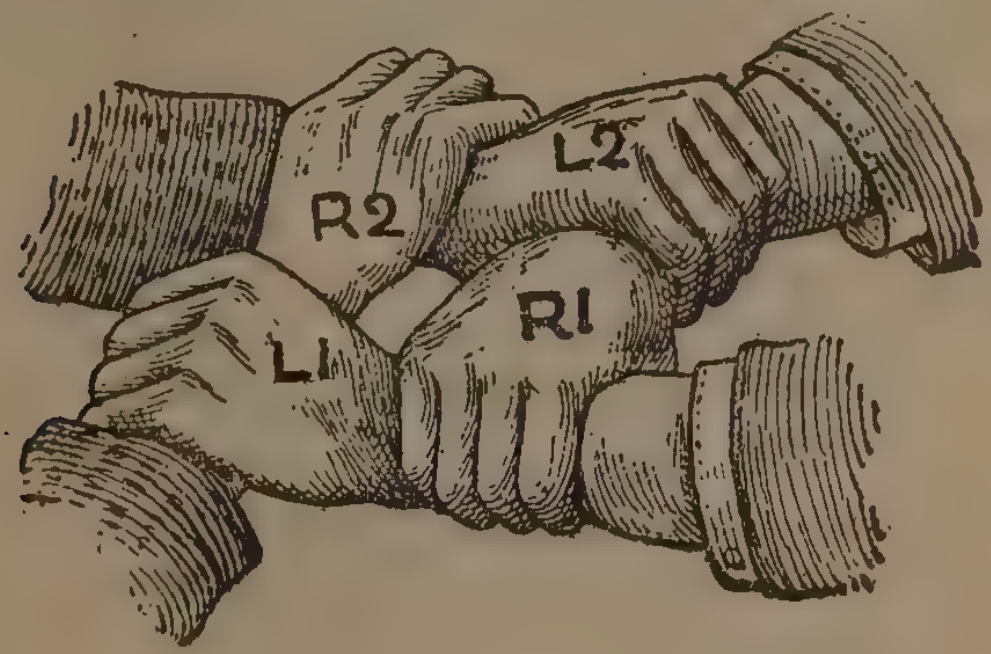


FIG. 76.

bearer on the right hand side of the patient with the right foot, and the left-hand bearer with the left foot.

THE FIREMAN'S LIFT.

(To be attempted only by a strong man.)

Turn the patient face downwards; place yourself at his head, stoop down, slightly raise his head and

shoulders and take hold of him close under his armpits, locking your hands on his back. Raise his body and rest it on your left knee; shift your arms and, taking him round his waist, lift him until his head rests on your left shoulder. Throw his left arm over your head, stoop down and place your left arm between his thighs, letting his body fall across your shoulders. Rise to an upright position; hold the patient's left wrist with your left hand and leave your right hand free.

Support by a Single Helper.

A single helper can give support. Put your arm round the injured person's waist, grasping his hip and placing his arm round your neck, holding his hand with yours (Fig. 77).

The plan of carrying the patient by the arms and legs with the face downwards, commonly called the "frogs' march," must never be used, as death may ensue from this treatment.

The Fore and Aft Method.

This plan of carrying is useful when space does not permit of a hand seat (See Fig. 78).

Improvised Stretchers.

A stretcher may be improvised as follows:—

1.—Turn the sleeves of a coat inside out; pass two strong poles through them; button the coat. The

FIG. 77.

FIG. 78.

patient sits on the back of the coat and rests against the back of the front bearer (Fig. 79). If a longer stretcher is required, two or three coats must be treated in the same manner. The poles may be kept

FIG. 79.

FIG. 80.

apart by strips of wood lashed to the poles at both ends of the bed formed by the coats (Fig. 80).

2.—Make holes in the bottom corners of one or two sacks and pass stout poles through them.

3.—Spread out a rug, piece of sacking, tarpaulin, or a strong blanket, and roll two stout poles up in the sides. Two bearers stand on each side and grasp the middle of the pole with one hand, and near the end with the other. They walk sideways.

4.—A hurdle, broad piece of wood, or shutter may be used as a stretcher; some straw, hay, or clothing should be placed on it, and covered with a piece of stout cloth or sacking; the latter is useful in taking the patient off the stretcher.

Always test an improvised stretcher before use.

THE "FURLEY" STRETCHERS.

The "Furley" Stretchers (Model 1899) are of three patterns, viz., "Ordinary," "Telescopic-handled," and "Police." In general principle they are alike, the component parts being designated the poles, handles, jointed traverses, runners, bed, pillow sack and slings.

The Ordinary Stretcher (Fig. 81) is 7 feet 9 inches in length, and 1 foot 10 inches wide. The bed is 6 feet in length, and the handles $10\frac{1}{2}$ inches. The height is $5\frac{3}{4}$ inches. The weight is 21 to 22 lbs. At the head of the stretcher is a canvas overlay (the

pillow sack), which can be filled with straw, hay, clothing, etc., to form a pillow. The pillow sack opens towards the head, and its contents can therefore be adjusted without undue disturbance of the patient. The traverses are provided with joints, for opening or closing the stretcher. The Telescopic-handled pattern (Fig. 82) is very similar, but the handles can be slid underneath the poles, thus reducing the

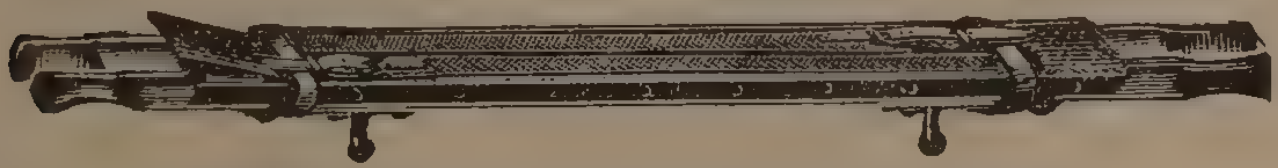


FIG. 81.—ORDINARY STRETCHER—CLOSED.

FIG. 82.—TELESCOPIC-HANDLED STRETCHER—OPEN.

length to 6 feet. This arrangement is of great value when working in confined spaces, or when a patient has to be taken up or down a narrow staircase with sharp turns. The Police stretcher is similar to the Ordinary pattern, but is more strongly made, and has, in addition, straps for securing a refractory patient.

When closed, the poles of the stretcher lie close

together, the traverse bars being bent inwards, the canvas bed neatly folded on the top of the poles and held in position by the slings which are laid along the canvas, and secured by a strap, placed transversely at the end of each sling, being passed through the large loop of the other, and round the poles and bed.

Carriage of Stretchers.

As a general rule carry the patient feet foremost. The exceptions are:—

(*a*) When going up hill with a patient whose lower limbs are not injured.

(*b*) When going down hill with a patient whose lower limbs are injured.

STRETCHER EXERCISES.

Originally drawn up by Sir John Furley, revised in 1917 to accord with the drills adopted by the Royal Army Medical Corps:—

EXERCISE No. I.

For Four Bearers.

1.—The Instructor selects the bearers and numbers them—1, 2, 3, 4 at his discretion. Should one man be taller and stronger than the others, he should be No. 3, as he will have to bear the heavier part of the burden. All orders will be given by No. 4.

2.—"Stand to Stretcher."—No. 1 places himself on the left of the stretcher, with his toes in line with the front end of the poles; No. 3 with his heels in line with the rear end of the poles; No. 2 places himself midway between Nos. 1 and 3; No. 4 one pace in the rear of No. 3 (Fig. 83).

FIG. 83.

FIG. 84.

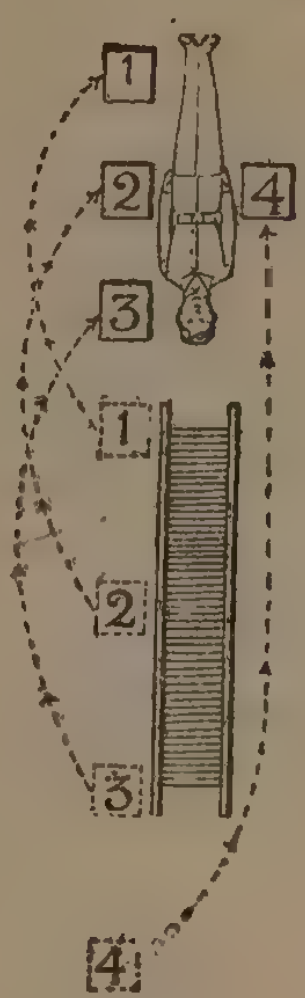


FIG. 85.

3.—"Lift Stretcher."—Nos. 1 and 3 stoop, grasp both handles of the poles firmly with the right hand,

rise together, holding the stretcher at full extent of the arm, runners to the right.

4.—"**Collect Wounded.**" — The squad will double by the shortest route to the patient, and halt when one pace from the head of the patient (Fig. 84).

5.—"**Lower Stretcher—Prepare Stretcher.**" —Nos. 2 and 4 proceed to the patient and render treatment; Nos. 1 and 3 turn to the right, kneel on the left knee, unbuckle the transverse straps and place the slings on the ground beside them, separate the poles and straighten the traverses; then each takes up a sling, doubles it on itself, slips the loop thus formed on the near handle, and places the free ends over the opposite handle, buckle uppermost. They then rise and turn to the left together. If required to assist Nos. 2 and 4, they will proceed to the patient (Fig. 85).

6.—"**Load Stretcher.**"—When the patient is ready for removal on the stretcher, No. 4 will give the command "**Load—Stretcher,**" when the bearers, unless otherwise directed by No. 4, will place themselves as follows:—Nos. 1, 2 and 3 on the left of the patient, No. 4 on the right; No. 1 at the knees, No. 2 at the hips, No. 3 at the shoulders, No. 4 opposite No. 2. The whole, turning inwards together and kneeling on the left knee, will pass their hands beneath the patient. No. 1 supports the legs, Nos. 2 and 4 the thighs and hips, No. 3 the upper part of the trunk, passing his left hand across the patient's chest and

under the right shoulder, and his right hand beneath the left shoulder (Fig. 86).

7.—"**Lift.**"—The patient will be carefully lifted on to the knees of Nos. 1, 2 and 3 (Fig. 87). No. 4 will

FIG. 86.

disengage, rise, turn to his left, double to the stretcher, take hold of it, left hand across, resting the near pole on his left hip, return to the patient and place the stretcher directly beneath him (Fig. 88), then stand up

and return to his former position, kneel on his left knee, join hands with No. 2, and assist in lowering the patient.

FIG. 87.

8.—**"Lower."**—The patient is lowered slowly and gently on to the centre of the canvas, special care being taken of the injured part (Fig. 89). The bearers then

disengage, rise, Nos. 1, 2 and 3 turn to the left, No. 4 to the right, and stand to stretcher; thus No. 1 with toes in line with front handles, No. 3 with heels in line with rear handles, No. 2 midway between Nos. 1 and 3. No. 4 on the right hand side of the stretcher in line with No. 1.

FIG. 88.

9.—"**Lift Stretcher.**"—On the word **Stretcher,** Nos. 1 and 3 stoop, grasp the doubled sling midway between the poles with the right hand and sweep it off the handles, rise, holding it at full length of the arm, buckle to the front. They then take a side-pace between the handles and place the sling over the

shoulders, dividing it equally, buckle to the right. The sling should lie well below the collar of the coat behind and in the hollow of the shoulders in front. They stoop, slip the loops over the handles, commencing with the left, and grasp both handles firmly. They then rise slowly together lifting the stretcher, No. 3 conforming closely to the movements of No. 1.

FIG. 89.

10.—"Adjust Slings."—No. 2 will turn about (always turn *from* a *loaded* stretcher—*to* a *closed* stretcher), step forward one pace and adjust the sling of No. 3. No. 4 will turn to the left and adjust the sling of No. 1. Having done this, No. 2 will turn about and step forward one pace; No. 4 will turn to the right.

11.—"March."—The bearers move off: Nos. 1, 2 and 4 stepping off with the left foot, and No. 3 with the right (Fig. 90). The step should be a short one

FIG. 90.

of twenty inches, and taken with the knees bent and without spring from the fore part of the foot.

12.—"Halt."—The bearers remain steady.

13.—"**Lower Stretcher.**"—Nos. 1 and 3 slowly stoop and place the stretcher gently on the ground (No. 3 conforming to the movements of No. 1), slip the loops from the handles and stand up. They remove the slings from the shoulders, hold them as described in Order 9, take a side-pace to the left, and stand to stretcher. They then place the slings on the handles (as in Order 5) and rise together.

14.—"**Unload Stretcher.**"—The bearers will place themselves as described for loading in Order 6.

The patient is lifted as described for loading.

No. 4 grasps the stretcher as described for loading, and, lifting it clear of the patient, carries it forward three paces clear of the patient's feet. He then rejoins the squad, kneels on his left knee, joins hands with No. 2, and assists in lowering the patient to the ground. The bearers rise and turn towards the stretcher, the whole step off to their places at the stretcher.

15.—"**Close Stretcher.**"—Nos. 1 and 3 turn to the right, kneel on the left knee, remove the slings and place them on the ground beside them, push in the traverses, raise the canvas, and approximate the poles; they then rise, lifting the stretcher, and face one another; place the handles of the poles between their thighs, runners to the right, fold the canvas to the right, lightly on the poles. Each takes up a sling and passes the buckle end to the other, and holding

the buckle end in the left hand, threads the transverse strap through the loop of the other sling, and buckles it tightly close to the runners, keeping the sling on top. Then grasping both handles in the right hand, back of hand to the right, they turn to the right in a slightly stooping position, rise and turn to the left together.

CHANGING NUMBERS.

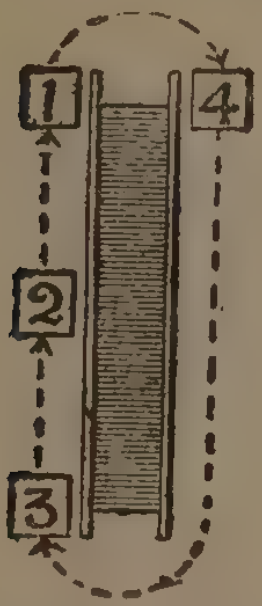


FIG. 91.

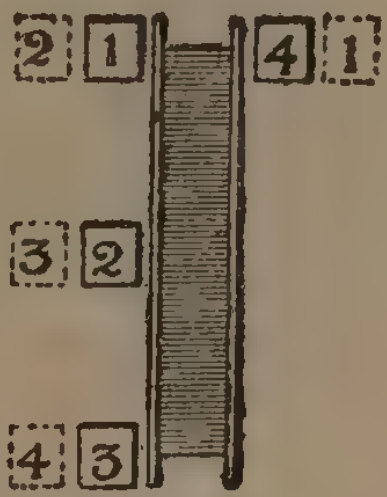


FIG. 92.

"Change Numbers."—No. 4 will turn about; the whol will step off together, No. 1 wheeling round by the front of the stretcher and taking up the position of No. 4 (Fig. 91). Each man halts in the position of the bearer whose place he has taken. The new No. 4 will turn about.

N.B.—The figures in dotted squares (Fig. 92) show the new positions of the old numbers.

EXERCISE No. II.

For Three Bearers.

1.—The Instructor selects the bearers and numbers them—1, 2, 3—at his discretion. Should one man be taller and stronger than the others, he should be No. 3, as he will have to bear the heavier part of the burden. All orders will be given by No. 2.

2.—"**Stand to Stretcher.**"—No. 1 places himself on the left of the stretcher, with his toes in line with the front end of the poles; No. 3 with his heels in line with the rear end of the poles; No. 2 places himself midway between Nos. 1 and 3.

3.—"**Lift Stretcher.**"—Nos. 1 and 3 stoop, grasp both handles of the poles firmly with the right hand, rise together, holding the stretcher at full extent of the arm, runners to the right.

4.—"**Collect Wounded.**" — The squad will double by the shortest route to the patient, and halt when one pace from the head of the patient.

5.—"**Lower Stretcher—Prepare Stretcher.**"—No. 2 proceeds to the patient and renders treatment; Nos. 1 and 3 turn to the right, kneel on the left knee, unbuckle the transverse straps and place the slings on the ground beside them, separate the poles, and straighten the traverses; then each takes up a sling, doubles it on itself, slips the loop thus formed on the near handle, and places the free ends

over the opposite handle, buckle uppermost. They then rise and turn to the left together. If required to assist No. 2 they will proceed to the patient.

6.—"**Load Stretcher.**"—When the patient is ready for removal on the stretcher, No. 2 will give the command "**Load Stretcher,**" when the bearers,

FIG. 93.

unless otherwise directed by No. 2, will place themselves as follows: No. 1 on the left side of the patient in a line with his knees, No. 2 on the right side just below the patient's shoulders, and No. 3 at the left side, facing No. 2. All kneel on the left knee. **No. 1**

places his hands, well apart, underneath the lower limbs, always taking care, in case of a fracture, to have one hand on each side of the seat of injury. Nos. 2 and 3 grasp each other's hands under the shoulders and hips of the patient. (Fig. 93.)

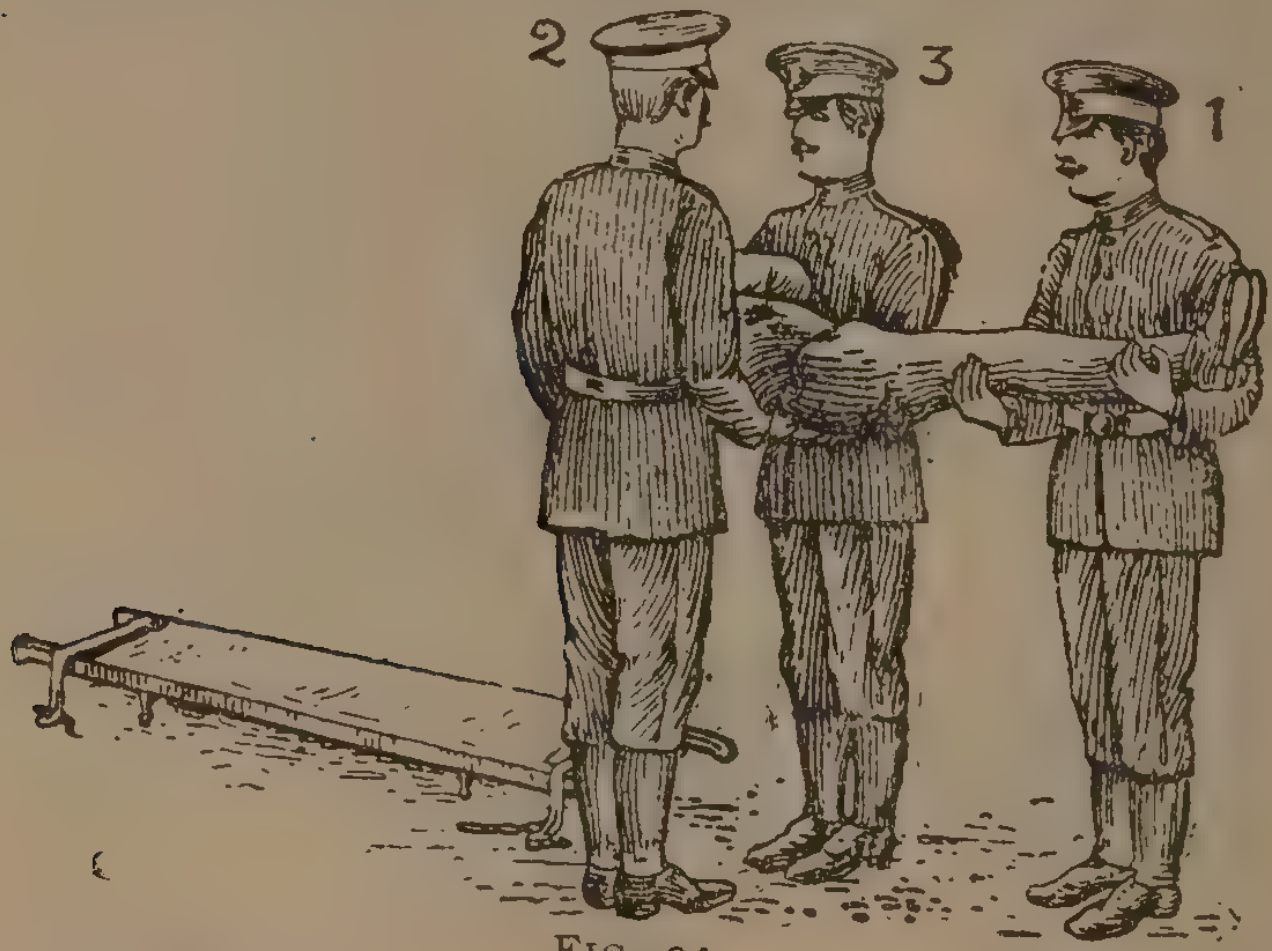


FIG. 94.

7.—"**Lift.**"—The bearers rise together, keeping the patient in a horizontal position. (Fig. 94.)

8.—"**March.**"—All take short side-paces, carrying the patient over the stretcher until his head is immediately above the pillow.

9.—"**Halt.**"—The bearers remain steady.

10.—"**Lower.**"—The bearers stoop down, gently place the patient on the stretcher, disengage their hands, and then stand up. Nos. 1 and 3 turn to the left, No. 2 to the right, and stand to stretcher; thus No. 1 with toes in line with front handles, No. 3 with heels in line with rear handles, No. 2 in the centre on the right-hand side of the stretcher.

11.—"**Lift Stretcher.**"—On the word **Stretcher,** Nos. 1 and 3 stoop, grasp the doubled sling midway beween the poles with the right hand and sweep it off the handles, rise, holding it at full length of the arm, buckle to the front. They then take a side-pace between the handles and place the sling over the shoulders, dividing it equally, buckle to the right. The sling should lie well below the collar of the coat behind and in the hollow of the shoulders in front. They stoop, slip the loops over the handles, commencing with the left, and grasp both handles firmly. They then rise slowly together lifting the stretcher, No. 3 conforming closely to the movements of No. 1.

(No. 2 will now adjust the slings, if required.)

12.—"**March.**"—The bearers move off: Nos. 1 and 2 stepping off with the left foot, No. 3 with the right. The step should be a short one of twenty inches, and taken with the knees bent and no spring from the fore part of the foot.

13.—"Halt."—The bearers remain steady.

14.—"Lower Stretcher."—Nos. 1 and 3 slowly stoop and place the stretcher gently on the ground (No. 3 conforming to the movements of No. 1), slip the loops from the handles, and stand up. Remove the slings from the shoulders, hold them as described (in Order 11), take a side-pace to the left, and stand

CHANGING NUMBERS.

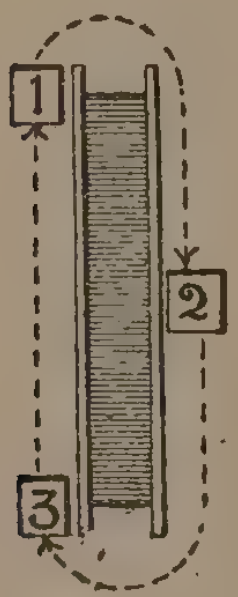


FIG. 95.

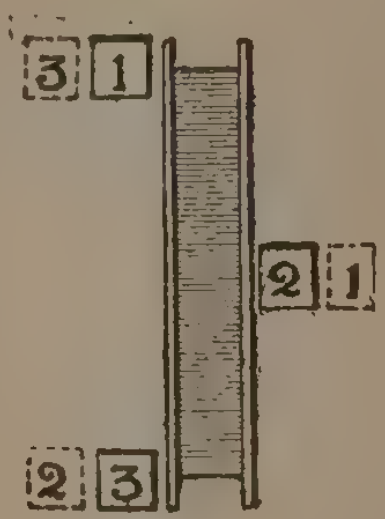


FIG. 96.

to stretcher. Then place the slings on the handles (as in Order 5) and rise together.

15.—"Unload Stretcher."—The bearers will place themselves and lift and carry the patient by short side-paces (as in Orders 6 and 7) clear of the stretcher, to the bed, or other place to which it has been arranged to convey him.

16.—"Close Stretcher."—As in Exercise No. I.

Changing Numbers.

"Change Numbers."—No. 2 will turn about; the whole will step off together, No. 1 wheeling round by the front of the stretcher and taking up the position of No. 2 (Fig. 95). Each man halts in the position of the bearer whose place he has taken. The new No. 2 will turn about.

N.B.—The figures in dotted squares (Fig. 96) show the new positions of the old numbers.

EXERCISE No. III.

For use in Mines and Narrow Cuttings where Two Men only can be Engaged.

Nos. 1 and 2 will carefully place the stretcher in a line with the injured man's body, the foot of the stretcher being, if possible,* close to his head.

No. 1 straddles across the patient's legs, placing his right foot, with the toe turned outwards, a little below the patient's knees, and with the toe of the left foot close to the heel of No. 2; he then stoops down, passes the left hand under the patient's thighs and

* It is not advisable to be too particular as to the head or foot of a stretcher in a mine, as it would probably be quite impossible to reverse it.

the right hand under the patient's calves. No. 2 places his feet one on each side of the patient between his body and arms, the toe of each foot as near the armpits as possible. He then stoops down and passes his hands between the sides of the chest and the arms underneath the shoulders, and locks

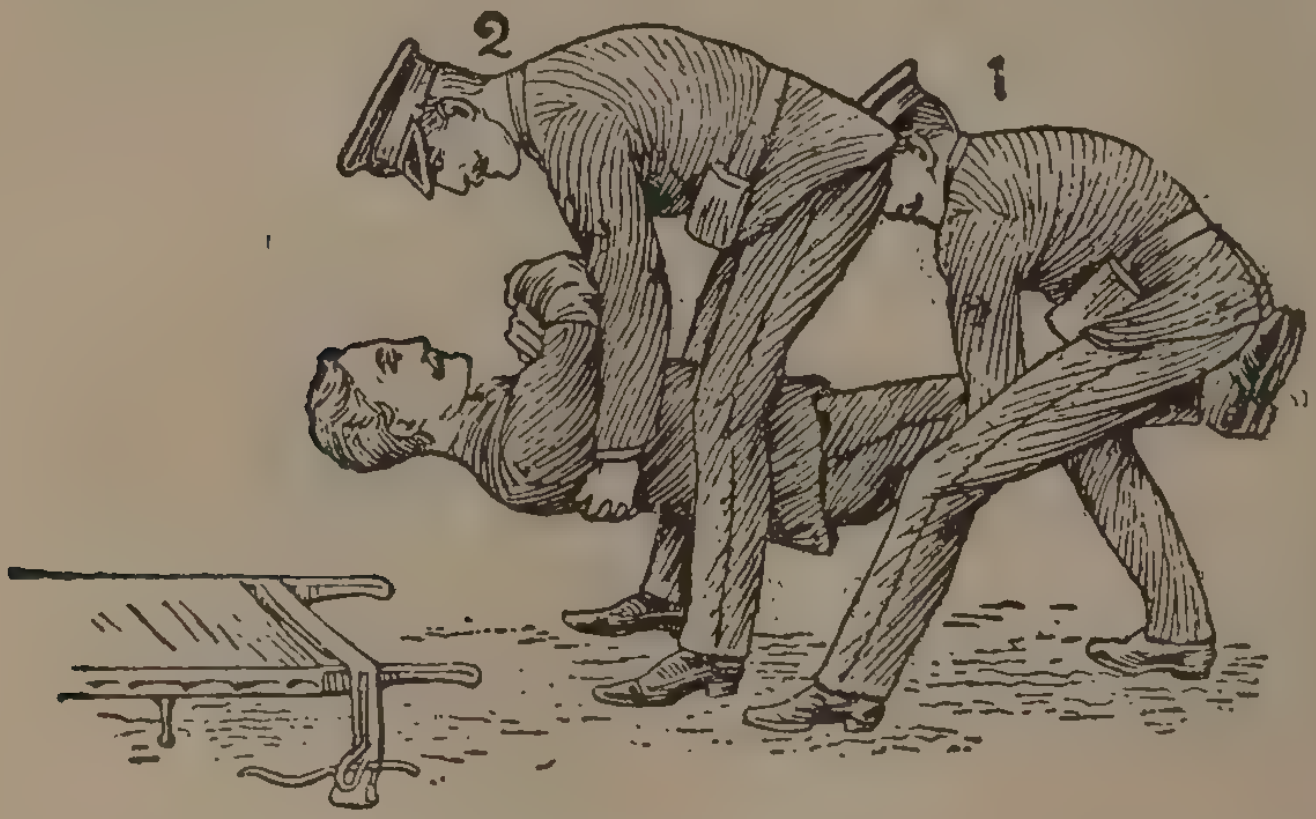


FIG. 97.

the fingers (Fig. 97). If the patient's arms are uninjured he may put them round the neck of No. 2, and by this means greatly assist him in lifting.

When both are ready, No. 1 will give the order **"Lift and move forward."** The patient is then to

be slowly lifted, just sufficient to allow his body to clear the stretcher. Both bearers will slowly and gradually move the patient forward, No. 2 by very short steps, No. 1 by bending his body forward as much as he can *without moving his feet* (Fig. 98). No. 1 now gives the order "**Halt,**" whereupon No. 2 remains steady, and No. 1 advances his right foot to his left, and

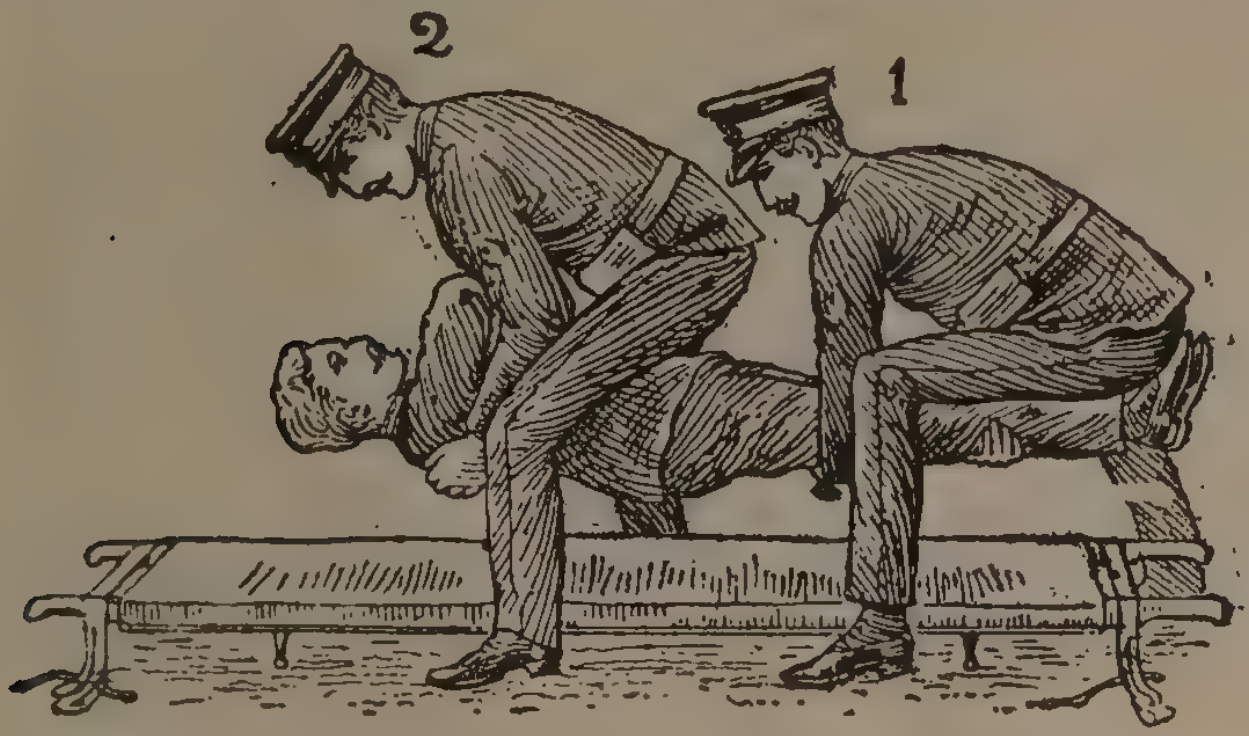


FIG. 98.

again advances his left foot till the toe touches the heel of No. 2. No. 1 then gives the order "**Advance,**" when the patient will again be moved forward. These movements are to be repeated until the patient is over the stretcher, when he is to be gently lowered.

To Load an Ambulance.

The stretcher will be lowered with the head one pace from the end of the ambulance.

Nos. 1 and 3 turn to the right, kneel on the left knee, pass the loop of the buckle end of the sling over the near handle, buckle downwards; carry the sling under and round the opposite handle close up to the canvas, back to the near handle, round which two or three turns are made; pass the transverse strap round the pole between the runners and traverse, and fasten the buckle outside the sling between the poles. The bearers then rise and stand to stretcher.

The bearers will now take up their positions as follows:—Nos. 1 and 3 on the left, 2 and 4 on the right. No. 2 opposite to No. 3, at the head.

"**Load.**"—The bearers turn inwards, stoop, grasp the handles of the stretcher, hands wide apart, palms uppermost; they rise slowly, lifting the stretcher, holding it level at the full extent of the arms. They then take a side pace to the ambulance, lift on to a level with its floor, place the runners on it, Nos. 1 and 4 slightly raising the foot. The stretcher is then gently pushed into its place, Nos. 2 and 3 making way for the stretcher to pass between them.

Many ambulances are provided with upper and lower berths. In such cases the upper berths should be loaded first, beginning on the off side.

To Unload an Ambulance.

Nos. 1 and 4 will take hold of the handles at the foot and gently withdraw the stretcher. As it is withdrawn, Nos. 2 and 3 will take hold of the handles at the head, and taking the weight, lower it to the full extent of the arms, then by side paces march clear of the ambulance; lower the stretcher to the ground.

To Cross a Ditch.

The stretcher should be lowered with its foot one pace from the edge of the ditch. Nos. 1 and 4 bearers then descend. The stretcher is now advanced, Nos. 1 and 4 in the ditch supporting the front end while the other end rests on the edge of the ground above. Nos. 2 and 3 now descend. All the bearers now carry the stretcher to the opposite side, and the foot of the stretcher is made to rest on the edge of the ground, while the head is supported by Nos. 2 and 3 in the ditch. Nos. 1 and 4 climb out. The stretcher is lifted forward on the ground above, and rests there while Nos. 2 and 3 climb up.

To Cross a Wall.

The stretcher is lowered with the foot about one pace from the wall; the bearers then stand to stretcher, Nos. 1 and 3 on the left, Nos. 4 and 2 on the right. They turn inwards, stoop down, grasp the poles with both hands; they rise slowly, lifting the stretcher, holding it level at the full extent of the arms. Then

by side paces advance to the wall, raise the stretcher and lift it on to the wall, so that the front runners are just over the wall. No. 1 then crosses the wall and takes hold of the front handles; No. 4 then crosses the wall, they grasp the poles, lift the foot of the stretcher; all the bearers then advance and lift the rear runners over the wall, resting the rear handles on the wall; No. 3 then crosses the wall and takes hold of the left pole, No. 2 then crosses the wall and takes hold of the right pole. The bearers then advance until the stretcher is clear of the wall. The stretcher is then lowered to the ground.

Lifting into Bed.

Place the stretcher at the side of the bed. The bearers to take positions as in Stretcher Exercise No. I., Nos. 1, 2 and 3 being on the side furthest from the bed. The patient to be unloaded on to the knees of Nos. 1, 2 and 3, as in Exercise No. I. No. 4 will disengage, remove the stretcher (this can be done by pushing it under the bed). No. 4 then joins hands with No. 2. All the bearers rise to a standing position, supporting the patient on their forearms. No. 4 disengages and goes to the patient's head. All bearers then step forward and gently place the patient on the bed.

Or, if the bed is narrow, and there is room, the stretcher may be placed on the floor with the head

close to the foot of the bed. The injured person may then be lifted over the foot and placed on the bed.

The first method is preferable.

Carrying Upstairs.

In carrying a stretcher upstairs, the head should go first; an extra helper should assist at the lower end, so as to raise it and keep the stretcher nearly horizontal.

Chapter IX.

(Being the Sixth Lecture for Females only, in accordance with Syllabus 58.)

BY E. MACDOWEL COSGRAVE, M.D., F.R.C.P.I.

Preparation for Reception of Accident Cases.

When news of an accident comes, preparations should at once be made so as to have everything ready before the injured person is brought in. Of course the preparations needful will vary according to the nature and extent of the injury, but the following are the chief things which may have to be done.

Choice and Preparation of Room.

A room must be chosen. In a bad case this should be one easily reached, as it is difficult to carry an injured person through narrow passages and up-stairs. Unless there is some such reason against it, the injured person's own room is best.

The way to the room must be cleared, projecting furniture and loose mats in the hall or in lobbies should be removed. If the injured person is carried on a door, shutter, or stretcher, two strong chairs should be placed ready to support it wherever the bearers would be likely to require rest.

Useless furniture should be removed from the bedroom. The bed should be drawn out from the wall

so that both sides can be approached, and the clothes turned back to one side to their full length. A hot bottle should be got ready. If there is much collapse several hot bottles and hot blankets may be required; cover the hot bottles with flannel.

If the injury is very severe, if mud-stained clothes have to be removed, or if extensive dressings have to be applied, it may be necessary to have another bed, a couch or a table placed near the bed to lay the sufferer on in the first instance. This should be so arranged that soiling may do no harm; old sheets, waterproof materials, thin oilcloths, or even newspaper, may be used as a protection.

Lifting and Carrying.

If present at the place where the accident occurred, it will be necessary to see that the patient is carefully lifted after proper "First Aid" has been rendered.

The following rules should be remembered:—Select the proper number of persons to assist, and do not let them lift the patient until they thoroughly understand how they are to do it.

For ordinary cases, where the injured person has to be lifted a very short distance, three helpers are sufficient. Two (who should be as far as possible of equal height) are to bear the weight, the third is to support and take charge of the injured part. This is

best done by a person who has been through a "First Aid" course. If the injured person is insensible, another helper should support his head.

The lifters, one at each side, should kneel on one knee, and pass their hands under the patient's back at the lower part of the shoulder-blades, and under the hips, clasping each his right hand in the other's left. The injured patient should, if practicable, place his arms round the necks of the bearers.

The third helper should attend to the seat of injury; if this is a fractured limb, he should support it by placing the palms of his hands under the limb, one above and one below the seat of the injury, grasping it firmly but avoiding unnecessary pressure.

The helpers should remain thus until the order "Lift" is given, and then they should all lift slowly and steadily, avoiding jars, attempts to change position of hands, etc.

If the injured person is to be placed on a stretcher or shutter, this should be previously placed with the bottom end at his head; the bearers should then move, one at each side of it, until the patient is over it. The word "Lower" should then be given, and the injured person should then be slowly lowered. A pillow or folded-up coat should be ready, and as the sufferer is lowered this should be placed under his head.*

---

* Full directions are given in Chapter VIII.

Means of Carrying.

Besides a stretcher, and substitutes such as a gate, a shutter, or a door, other means of carrying can be improvised.

In slight injuries, where the injured person is unable to walk, two bearers can carry him by forming a hand-seat or "Human Stretcher."

The two-handed seat is made as described on pages 165 and 166.

The Human Stretcher is made as described on pages 166 to 168.

A three-handed seat is made as described on pages 168 and 170.

A four-handed seat is formed as described on pages 170 and 171.

A single helper can lift by supporting with one arm the two knees, and with the other the back. The arms must be passed well under before commencing to lift.

A single helper can give support by putting his arm round the waist, grasping the hip and placing the injured person's arm round his own neck, holding the hand with his own hand. (Fig. 77, page 173).

A capital stretcher can be improvised out of a strong sheet and two broom handles or other short poles. Each side of the sheet is wound up on a broom handle until there is just room for a person to lie between. This requires four bearers, two at each side, to prevent the sheet slipping.

Carrying up Stairs.

In carrying a stretcher up stairs the head should go first, and an extra helper should assist at the lower end, so as to raise it and keep the stretcher nearly horizontal.

The two, three, or four-handed seat may be used for carrying up stairs; or a strong chair, the patient being carried up backwards. In the latter case one helper should walk after the chair and help to support it, and to prevent the injured person slipping out.

Lifting into Bed.

Follow the instructions on page 198.

Preparation of Bed.

A firm mattress, not a feather bed, should be selected. If there is much injury, or if dressings have to be applied, a draw-sheet ought to be placed on the bed. It should be of four or more thicknesses, extend across the bed, and reach from the middle of the patient's back to the knees. A piece of water-proof sheeting or of thin oil-cloth should be placed under the draw-sheet. As the draw-sheet becomes soiled, the soiled portion should be rolled and a clean part drawn smoothly under the patient.

In fracture of the leg or thigh, sprained ankle and some other cases, a "cradle" (Fig. 99) should be improvised. The use of a "cradle" is to support the bed-clothes and keep them from pressing on the limb. A band-box (Fig. 100), three-legged stool (Fig. 101), or hoop sawn across and the two halves secured

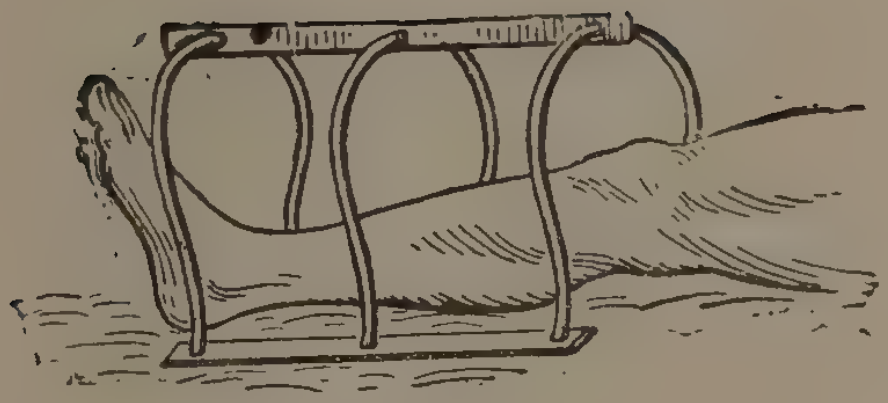


FIG. 99.

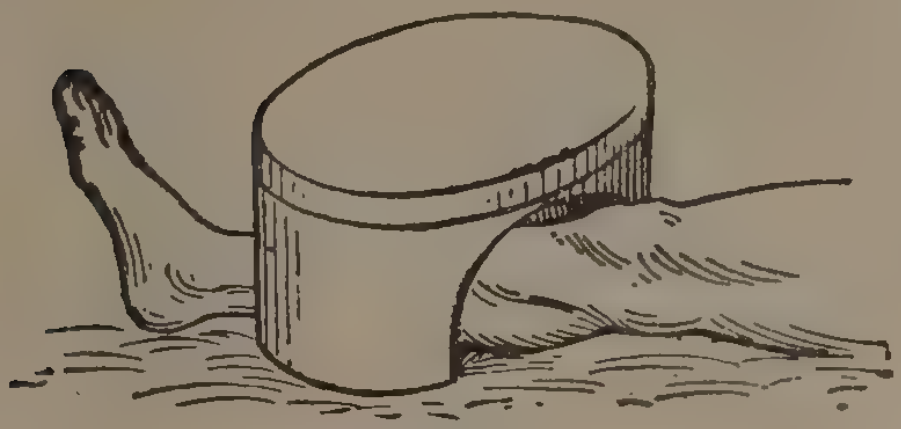


FIG. 100.

FIG. 101.

together (Fig. 102), may be used. A corkscrew passed through the bed-clothes, with its point guarded by a cork, and tied by string to the bed or a nail in the wall, will relieve the pressure of the bed-clothes effectually.

Removing the Clothes.

In taking clothes off an injured person a few rules should be borne in mind.

In serious cases it is much better to sacrifice the clothes than to run any risk of increasing the injury.

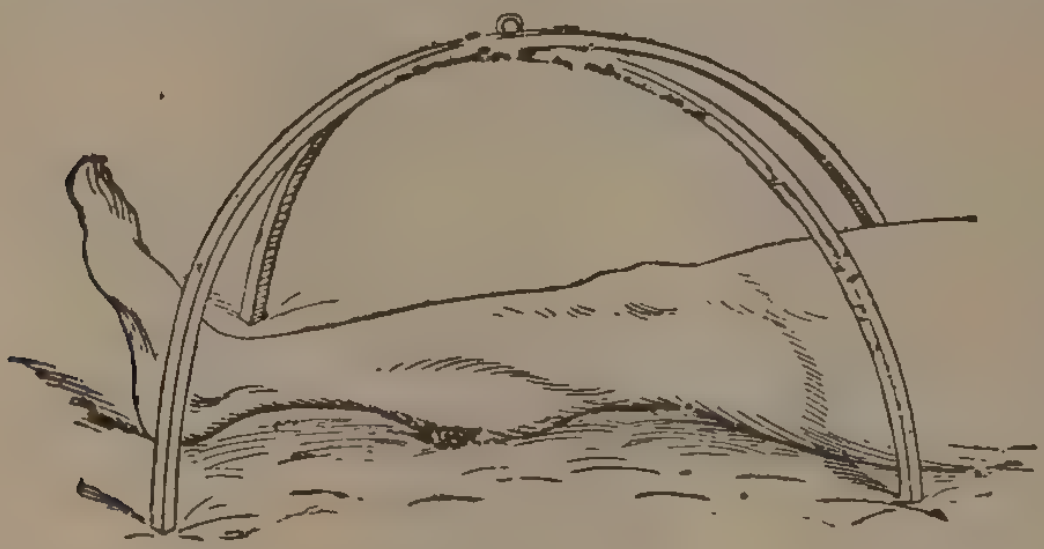


Fig. 102.

In removing a coat, etc., in a case of fractured arm the uninjured arm should be drawn out first.

In putting on a coat or shirt the injured arm should be put in first.

In burns and scalds nothing should ever be dragged off. A *sharp* pair of scissors should be used, and

everything not adhering should be cut away. If anything adheres it should be left until medical aid can be obtained. The clothing adhering may, with advantage, be soaked with oil. To remove the trousers from a severely injured limb, the *outside* seam should be ripped up.

Preparations for Surgeon.

As soon as the injured person has been attended to, preparation should be made for the surgeon's visit.

The preparations needful will depend upon the nature of the case. The following hints may be of use :—

A fire in the room helps ventilation, even in summer. There should be plenty of water, hot, cold, and also boiling, also several basins, plenty of clean towels and soap. There should be something to empty water into ; a foot-bath does well. The basins should be placed on a table, covered with a clean white cloth ; a large towel makes a suitable cloth ; the towels, folded up, should be placed on the same table, and the hot and cold water should be within easy reach. The foot-bath should be under the table or close at hand.

In the case of a burn, absorbent cotton wool, soft cloths, old linen, boracic ointment, and baking soda should be ready, and materials should be torn up for bandages.

In the case of hæmorrhage, plenty of water should be boiled and allowed to cool, and pads of absorbent

cotton wool should be baked in a tin box in the oven, and at least two basins should be ready.

In the case of a person rescued from drowning, the sheets should be taken off the bed, plenty of blankets should be heated before the fire, and several hot bottles should be ready.

If poultices are likely to be required, boiling water, linseed meal, mustard, a loaf of stale bread, a small basin, a large spoon, sweet oil, and tow, flannel or handkerchiefs may be required.

For fomentation, have boiling water, flannel, a kitchen roller and two sticks, or a large towel.

When summoning a medical man to an accident, always let him know by a written message what kind of case he is required to treat, so that he may bring whatever is needful. By this means valuable time may be saved.

QUESTIONS ON CHAPTER IX.

The numerals indicate the pages where the answers may be found.

	PAGE
What would you consider when choosing a sick room?...	200
How would you prepare the way to the sick room? ...	200
How would you place and arrange the bed? ...	200, 201
How would you prepare hot bottles?	201
What is often necessary to lay the sufferer on in the first instance?	201

PAGE

How would you see to the proper lifting and carrying of an injured person? 201, 202
What substitutes for a regular stretcher can you suggest? 203
Demonstrate hand seats and explain their uses 203
How can a single helper lift? 203
How can a single helper give support? 203
How would you improvise a stretcher? 203
How should a stretcher be carried upstairs? 204
How would you carry a patient upstairs on a chair? ... 204
How would you lift a patient from a stretcher to a bed? 204
How should a bed be prepared for an injured person? ... 204
How should a draw sheet be made and used? 204
What is the use of a "cradle"? 204
In what ways may a cradle be improvised? ... 204–206
How would you remove or put on a coat or shirt in the case of a fractured arm? 206
In the case of a bad burn, what would you do with clothing that adhered to the patient? ... 206, 207
How would you remove trousers in a serious case? ... 207
What preparations would you make for the surgeon? ... 207
What would you get ready in the case of a burn? ... 207
And what in the case of hæmorrhage? 207, 208
And what in the case of a person rescued from drowning? 208
What would you get ready for making poultices? ... 208
And for fomentation? 208
What sort of a message would you send to a doctor? ... 208

Appendix.

THE ROLLER BANDAGE AND ITS APPLICATION.

(*Not included in the Syllabus of Instruction.*)

The Roller Bandage.

Roller bandages may be made by tearing appropriate material into strips of the desired width. These strips should be tightly rolled and the loose threads at the edges removed, or they may be bought ready made. A variety of materials, such as closely woven cotton, open woven cotton, gauze, domette, flannel, stockinette, etc., may be used, each having its special advantages for special purposes. They may be rolled

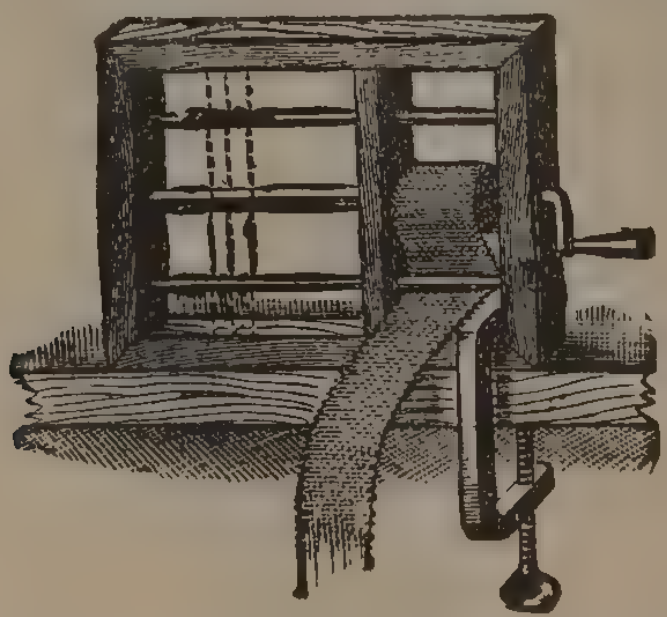


Fig. 103.

by hand or by means of a machine (Fig. 103). When a bandage is partly unrolled the roll is called the head, and the unrolled part the free end.

General Rules for Application.

1. See that the bandage is tightly and evenly rolled before attempting to use it.
2. Apply the outer side of the free end to the skin.
3. Never allow more than a few inches of the bandage to be unrolled at a time.
4. Bandage from below upwards.
5. As a rule, to which the figure of 8 bandage for a limb is an exception, each layer of the bandage should cover two-thirds of the preceding one.
6. Apply the bandage firmly and evenly, but not tightly enough to stop the circulation. If, on running the hand down it, the edges turn up, the bandage is too loose. If, after the bandage is taken off, red lines are seen, it has not been evenly applied.
7. When the bandage is finished, fix it securely by pinning or stitching.

Uses of the Roller Bandage.

Roller bandages are used :—

1. To retain splints or dressings in position.
2. To afford support to a part, for example, a sprained or dislocated joint, or a limb with varicose veins.
3. To make pressure on a part, for example, to reduce or prevent swelling ; or,
4. To drive the blood from a part of the body bandaged, as in the case of extreme collapse from hæmorrhage.

Methods of Application.

There are three principal methods of applying the roller bandage :—

1. **The simple spiral,** which is made by encircling the part with the bandage several times.

This method should only be adopted when the part to be bandaged is of uniform thickness. as, for instance, a man's chest, the finger, the wrist and a short portion of the forearm above it.

2. **The reverse spiral.**

This is used in bandaging parts of the limbs where owing to their varying thickness it is impossible to make a simple spiral lie properly. (See Fig. 107.)

3. **The figure of 8.**

The figure of 8 bandage consists of a series of double loops, and is so named from its resemblance to the figure 8. It is used for bandaging at or in the neighbourhood of a joint—the thumb, the breast, groin, and other parts. It may also be used instead of a reverse spiral for a limb. Certain bandages applied by the figure of 8 are called spicas

The few bandages illustrated and described in the following pages are to be regarded only as typical of the art of roller bandaging. When the principle by which parts are covered is understood, no difficulty should arise in applying any bandage. The points to which attention should be directed are evenness and firmness of application rather than making a com-

pleted bandage correspond exactly with the illustration of it—it will, in fact, be found that differently shaped limbs require slight modifications of the bandage.

Typical Bandages Described

In the description the patient is supposed to be standing with **his upper limbs hanging by his side, the thumbs turned outwards.** This, however, will not necessarily be the position in which he is placed to be bandaged.

Fig. 104.

For the Fingers.—*Width of bandage,* ¾ or 1 inc.. *Course.*—Outer to inner side of front of wrist, a sufficient length being left for tying; across back of hand to inner side of finger to be first bandaged (bandage the fingers in order from the little finger side), by one spiral to root of finger nail; round finger by simple (or if necessary reverse) spirals; thence to root of little finger and round wrist. Tie to free end left for the purpose, or continue to the next finger. (Fig. 104.)

Spica for the Ball of the Thumb.—*Width of bandage*, 1 inch. *Course.*—Across front of wrist; between thumb and finger; simple turn round thumb; diagonally across

FIG. 105.

FIG. 106.

front of thumb; across back of hand to wrist; across palm and round thumb, and continue until the ball of the thumb is covered. Finish by a turn round wrist and secure. (Figs. 105 and 106.)

Reverse Spiral for the Forearm.—*Width of bandage*, 2 or 2½ inches. *Course.*—From inner to outer side of front of wrist; across back of hand to first joint of little finger; across front of fingers; to inner then outer side of wrist. Repeat once.

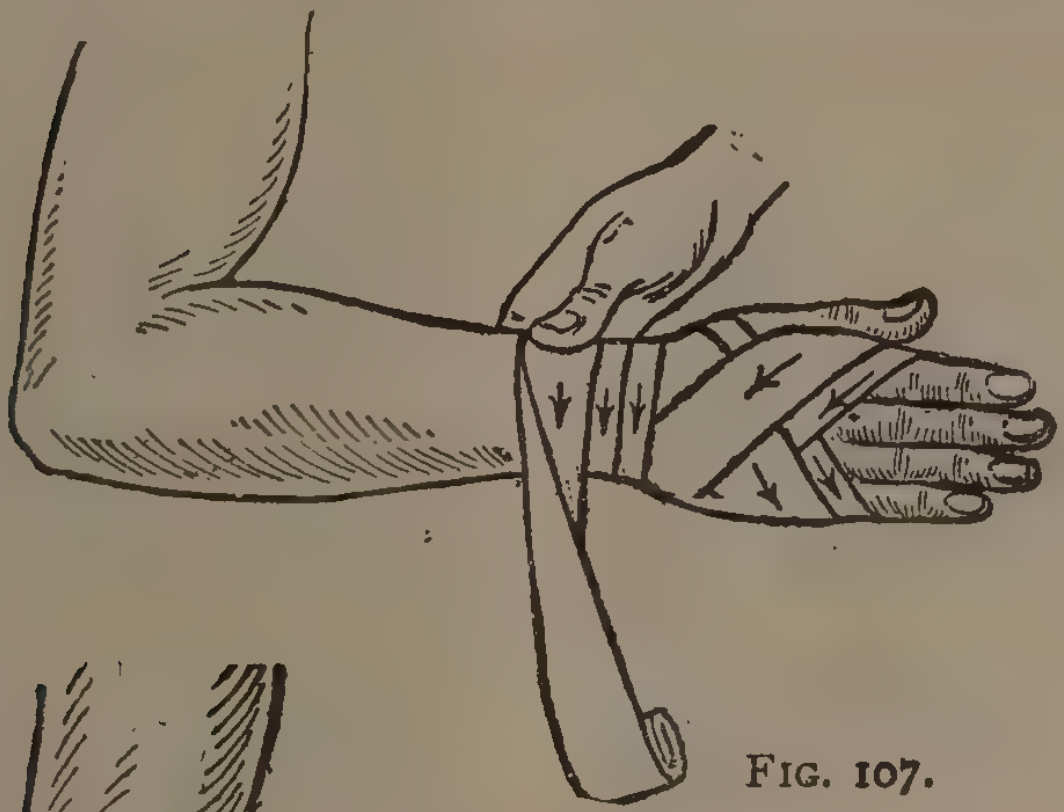


FIG. 107.

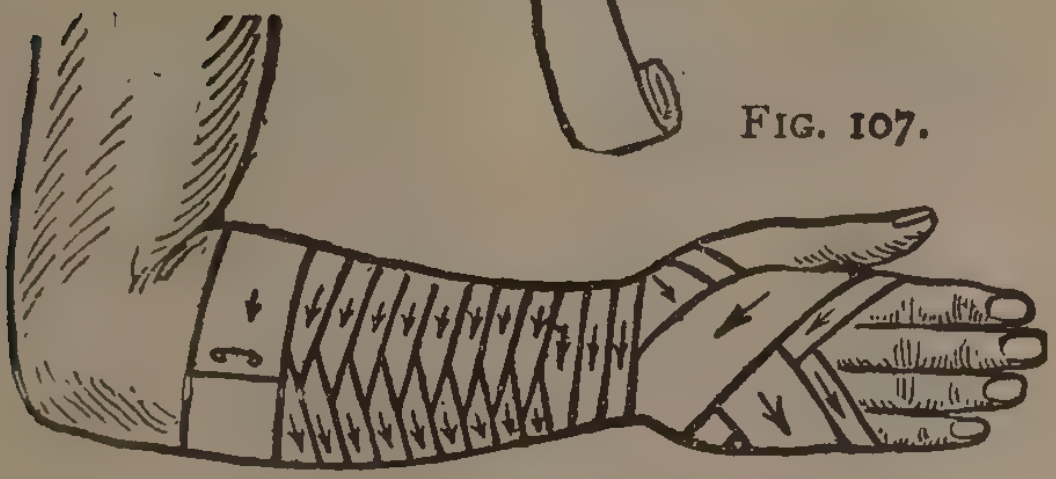


FIG. 108.

Two or three simple spirals round wrist. Reverse spirals on forearm. (Figs. 107 and 108.) The figure of 8 bandage, as for the leg, may be applied instead of the spiral.

Spica for (right) Groin.—*Width of bandage*, 3 inches. *Course.*—Fork to crest of right hip; across loins to left hip; thence to outer side of and behind right thigh. Repeat until the groin is sufficiently covered. (Figs. 109 and 110.)

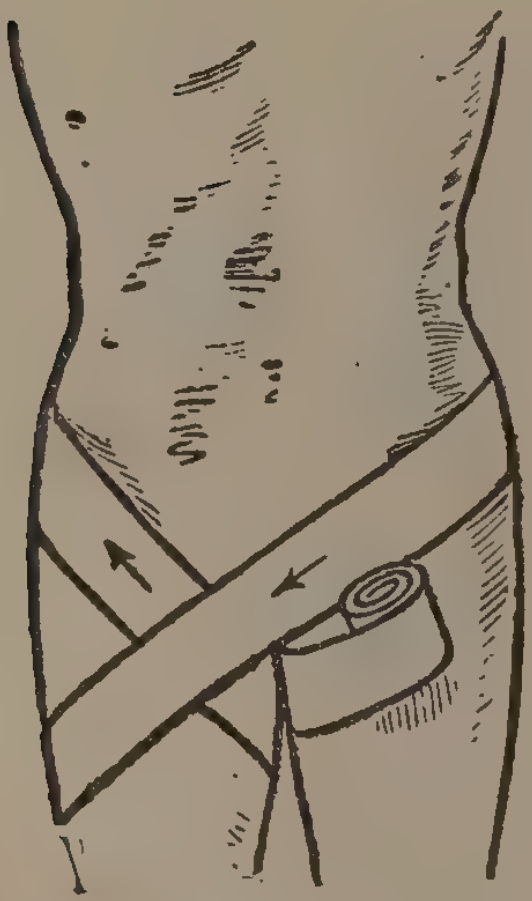


FIG. 109.

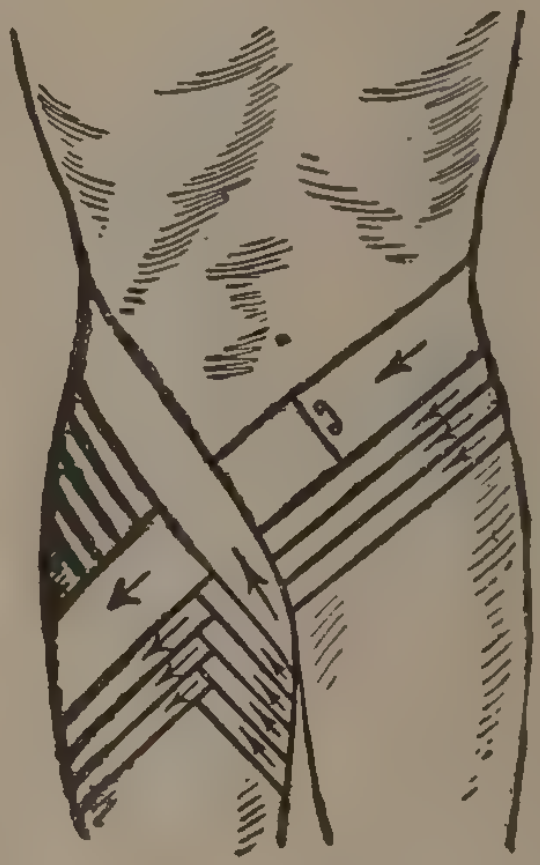


FIG. 110.

Spica for both Groins.—*Width of bandage*, 3 inches. *Course.*—(1.) Fork to crest of right hip; across loins to a little above left hip; thence to outer side of and behind right thigh. (2.) To right hip; across loins to overlap the lower two-thirds

of previous layer; to inner side of and behind left thigh; thence to right hip. Repeat (1) and (2) alternately until the groins are sufficiently covered. (Figs. 111 and 112.)

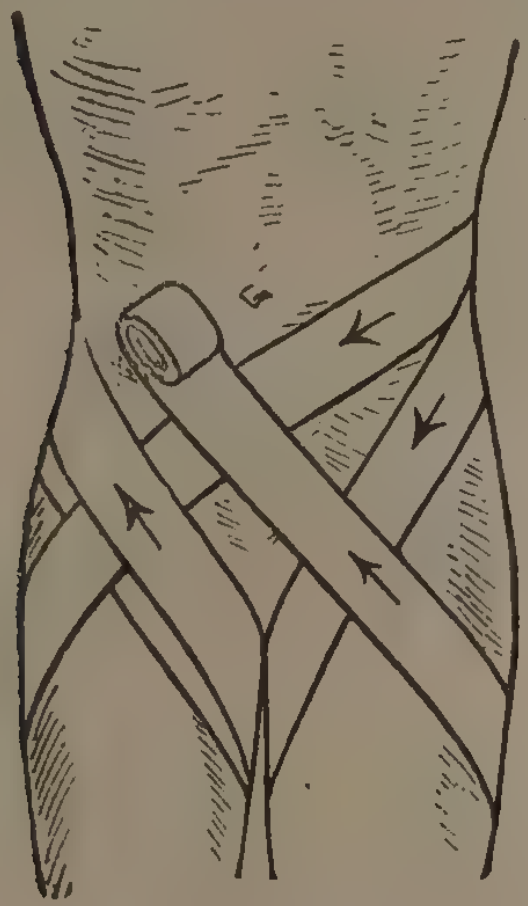


FIG. 111.

FIG. 112.

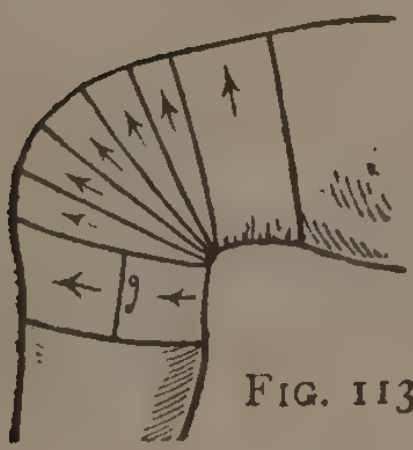


FIG. 113.

Figure of 8 Bandage for the Knee. —*Width of bandage*, 3 inches. *Course.*—Round knee and then alternately above and below. (Fig. 113.)

Figure of 8 Bandage for the Leg.—*Width of bandage*, 3 inches. *Course.*—From inner side of ankle to outer side of foot, round foot ; round ankle ; again round foot and ankle ; and thence up the limb by ascending figures of 8, each layer covering the previous one by one-half. (Figs. 114 and 115.) The reverse spiral, as for the forearm, may be applied instead.

FIG. 114.

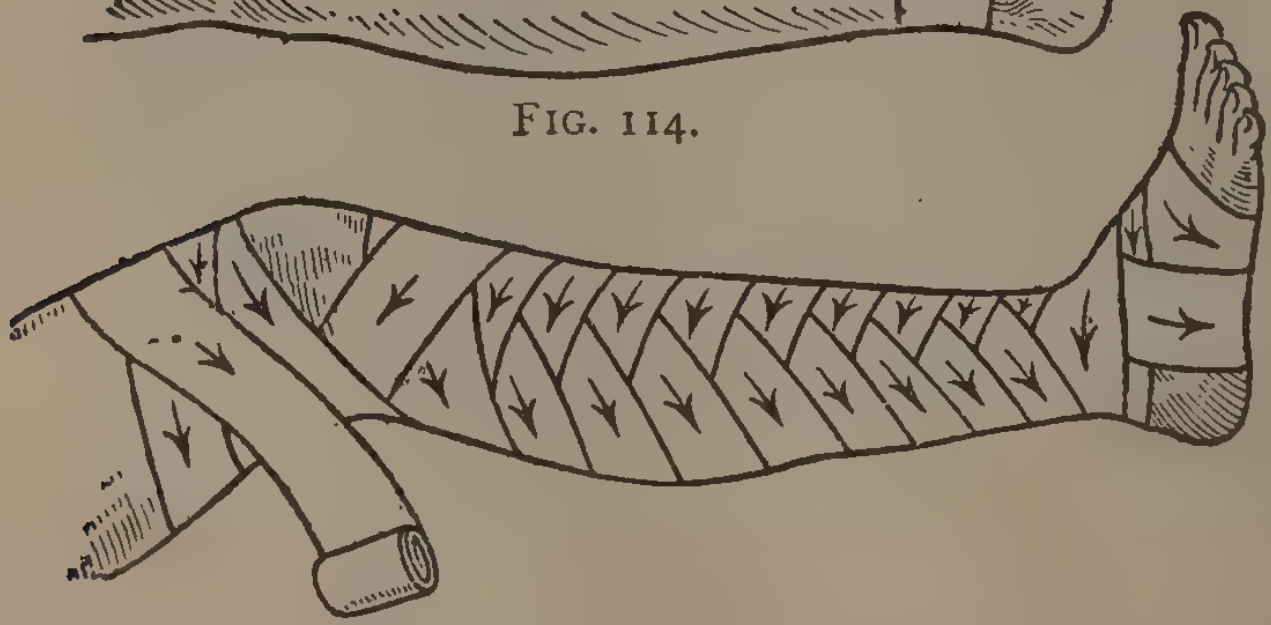


FIG. 115.

Many-Tail Bandage.—*To make the bandage*, feather-stitch together six strips of calico 3 inches wide, and in length about one and a half times as much as the circumference of the limb. (Fig. 116.) *Apply* as Fig. 117, securing the upper tails with a safety pin.

There are many other forms of the Many-Tail Bandage specially adapted for different parts of the body, for example,

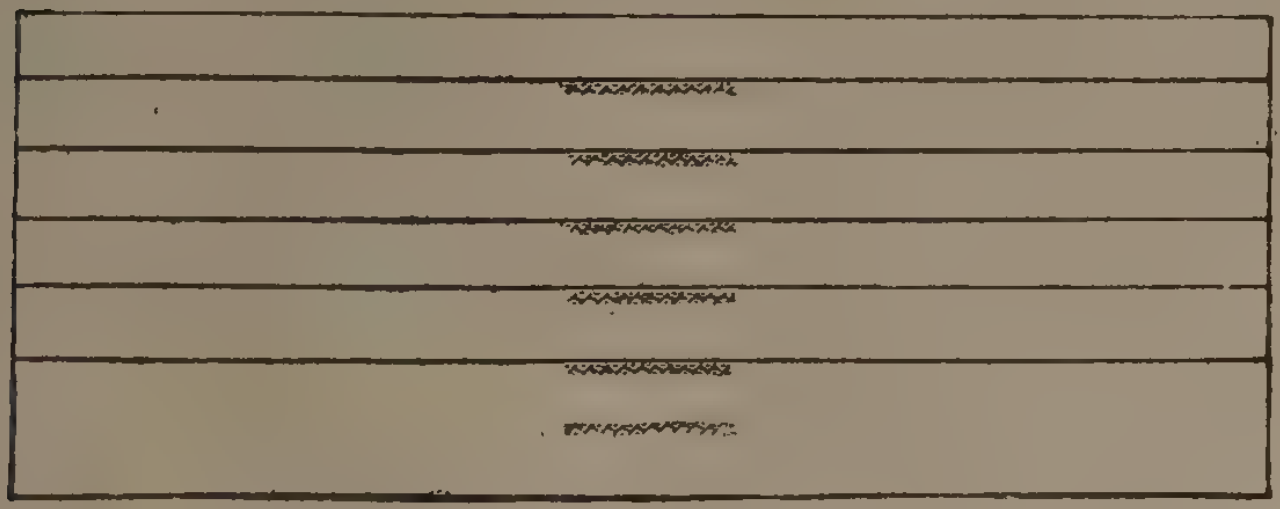


FIG. 116.

FIG. 117.

the back, front of chest, right or left shoulder, etc. In these bandages a "back piece" of appropriate shape is made to serve as the foundation for the tails. The chief advantage of this form of bandage is that a wound can be examined or a dressing changed without undue disturbance of the patient.

INDEX.

	Page
Abdomen	118
Accident case, preparation for	200
Acids, poisoning by	153, 154
Air, always necessary ...	25
Alcohol, poisoning by	129, 152, 158
Alkalies, poisoning by	153, 154
Ambulance, to load or unload	196, 197
Ammonia, poisoning by	153
Anatomy	27
Ankle	39
,, sprained	70
Anterior tibial artery ...	100
Aorta	87
Apoplexy	145
Apparently drowned, to restore ...	130, 135
Arm, bone of	35
,, fracture of ...	58
Arm-slings	46
Arsenic, poisoning by ...	153
Arterial hæmorrhage ...	80
Arteries	76
,, course of main ...	87
Artery, axillary	92
,, brachial... ...	94
,, carotid	87
,, dorsal of foot ...	100
,, facial	89
Artery, femoral	96
,, iliac	87
,, lingual	88
,, occipital ...	90
,, plantar	100
,, popliteal	97, 99
,, radial	95
,, subclavian ...	91
,, tibial	100
,, temporal ...	90
,, ulnar	95
Artificial respiration	130, 135, 140
Asphyxia ...	130, 135
Atlas	32
Auricles	76
Axillary artery	92
Axis	32
Back, bandage for ...	164
Backbone	30
Bandage, to apply ...	49
,, to fold ...	44
,, to improvise ...	44
Bandaging ...	160, 210
Bandaging roller ...	210
,, triangular ...	160
Bed, lifting into... ...	198
,, preparation of ...	204
Belladonna, poisoning by	152
Bites of rabid animals ...	102

	Page
Bladder	118, 120
Blood, circulation of ...	76
Brachial artery	94
Brain	123
,, compression of ...	145
,, concussion of ...	142
Breast-bone	33
,, fracture of ...	55
Broad bandage	44
Broken bones, *see Fracture.*	
Bronchial tubes	125
Brooch-bone	37
Bruises	107
Burns	111
Capillaries	76
Capillary hæmorrhage ...	102
Capsule	38
Carbolic acid, poisoning by	156
Carotid arteries	87
Carpus	35, 61
Carrying, means of	165, 203
,, upstairs	199, 204
Cartilage	32
Cause	20, 24
Cerebro-spinal system ..	123
Cervical vertebræ ...	32
Cheek, bleeding from ...	89
Chest, bandage for ...	163
Chlorodyne, poisoning by	152
Choking	132
Circulation of the blood	76
Circulation of the blood, to induce	141
Clavicle	33, 55, 56
Clothes, removal of	25, 206
Coccyx	32
Collapse	142
Collar-bone ...	33, 55, 56
Comminuted fracture ...	42
Complicated fracture ...	41
Compound fracture ...	41
Compression of the brain	145
Concussion of the brain	142
Conductor	133
Convulsants	152
Convulsions	147
Convulsions, infantile ...	148
Corrosive Sublimate, poisoning by	158
Cradle, bed ...	204–206
Cranium	29
,, fracture of ...	50
Crepitus	43
Crushed hand	61
,, foot	68
Cyanide of Potassium, poisoning by	156
Diaphragm	125
Digital pressure... ...	80
Direct violence	40
Dislocation	68
Ditch, to cross with stretcher	197
Dorsal artery of foot ...	100

	Page
Dorsal vertebræ... ...	32
Dress, woman's, on fire...	113
Drowning	130
Ear-channel, blood issuing from	107
Ear-passage, foreign body in	117
Elbow, bandage for ...	164
,, joint, fracture involving ...	59
Electric shock	133
Emetic	154
Epiglottis	124
Epilepsy	147
Expiration	125
External carotid artery...	87
Eye, bandage for ...	160
,, foreign body in ...	116
Face, bones of ...	29, 30
Facial artery	89
Fainting	142
Femoral artery	96
Femur	37, 62
Fibula	37, 66
Fingers, bandage for	164, 213
,, fracture of ...	61
,, hæmorrhage from	96
Fireman's lift	171
First Aid, meaning of ...	17
,, ,, principles of...	24
First Aider, qualifications of	22
Fish-hook, embedded ...	115
Fits	147
Flexion	83
,, at elbow ...	95
,, at knee	99
Food, poisoning by ...	157
Foot, bandage for ...	163
,, bones of	37
,, crushed	68
Fore and aft method of carrying	172
Forearm, bandage for ...	215
,, bones of ...	35
,, fracture of ...	60
Forehead, bandage for...	160
,, hæmorrhage from	90
Foreign body in the ear-passage ...	117
,, ,, in the eye	116
,, ,, in the nose	117
Four-handed seat ...	170
Fracture, apparatus for treatment of ...	43
,, causes of ...	40
,, general rules for treatment	48
,, involving elbow joint ...	59
,, of arm... ...	58
,, of breast-bone	56
,, of carpus ...	61
,, of collar-bone	55, 56
,, of cranium ...	50

	Page
Fracture of finger ...	61
,, of forearm ...	60
,, of knee-cap ...	64
,, of leg	66
,, of lower jaw ...	51
,, of metacarpus	61
,, of metatarsus...	68
,, of pelvis ...	62
,, of ribs... ...	53
,, of shoulder-blade ...	58
,, of spine ...	52
,, of tarsus ...	68
,, of thigh-bone...	62
,, of toes... ...	68
,, signs and symptoms of ...	42
,, varieties of ...	41
Frost-bite	114
Fungi, poisoning by ...	157
General circulation ...	76
Green-stick fracture	42, 43
Groin, bandage for	216, 217
Gums, hæmorrhage from	106
Hæmorrhage, arterial ...	80
,, capillary ...	102
,, from ear channel	107
,, from fingers	96
,, from gums	106
,, from head and neck	87
Hæmorrhage from lungs	106
,, from nose	105
,, from stomach	107
,, from throat	106
,, from tongue	106
,, from tooth socket ...	106
,, from upper limbs ...	91
,, internal ...	104
,, kinds of ...	80
,, venous ...	101
Hand, bandage for ...	162
,, bones of	35
Hanging	131
Haunch-bones	35
Head, bandage for ..	160
,, injury to	142
,, side of, bandage for	160
Heart	76
,, rate of contraction of	78
Heat-stroke ...	145, 146
Hernia	121
Hip, bandage for ...	162
History, meaning of ...	18
Human stretcher ...	166
Humerus... ...	35, 58
Hydrophobia	102
Hysteria	149
Iliac arteries	87
Impacted fracture	42, 43
Indirect violence ...	41

	Page
Insensibility	127
Insensibility, rules for treatment	128
Inspiration	125
Instep	37
Insulator	134
Internal carotid artery ...	87
Internal hæmorrhage ...	104
Intestines ... 118,	120
Involuntary muscles ...	40
Iodine, poisoning by ...	158
Irritants	153
Jaw, angle of	30
,, lower	30
,, ,, fracture of ...	51
Joint, definition of ...	38
Jugular vein	88
Kidneys 118,	120
Knee, bandage for 164,	217
Knee-cap	37
,, fracture of ...	64
Knot for bandage of lower limb	50
Knots, reef and granny	47
Laborde's method of artificial respiration ...	140
Laburnum seeds, poisoning by	152
Lacerated wound ...	86
Laudanum, poisoning by	152
Leg, bandage for ...	218
Leg, bones of	37
,, fracture of... ...	66
Lifting and carrying ...	201
,, into bed	198
Ligaments	38
Lightning, effects of 111,	131
Limbs, lower	35
,, upper	33
Lime in the eye... ...	117
Lips, bleeding from ...	89
Liver 118,	120
Lower limbs	35
Lumbar vertebræ ...	32
Lungs	125
,, hæmorrhage from	106
Many-tail bandage ...	219
Medium bandage ...	44
Metacarpus ... 35,	61
Metatarsus ... 37,	68
Middle line of body ...	27
Mouth, blood from ..	106
Muscles	39
,, ruptured ...	71
Muscular action... ...	41
Narcotics	152
Narrow bandage ...	44
Needle, embedded ...	115
Nervous system	123
Nose, foreign body in ...	117
,, hæmorrhage from	105

	Page
Occipital artery	90
Opium, poisoning by ...	152
Pad, ring...	91
,, to fold	85
Palm, hæmorrhage from	96
Palmar arches	95
Pancreas	118, 120
Paregoric, poisoning by	152
Patella	37, 64
Pelvis	35
,, fracture of ...	62
Perchloride of Mercury, poisoning by	158
Phalanges of foot ..	37
,, of hand ..	35
Phosphorus, poisoning by	153, 155
Physiology	27
Plantar arch	100
Plants, various, poisoning by	152
Pleura	125
Poisoned weapons, wounds by	102
Poisoning	152
Popliteal artery ...	97, 99
Posterior tibial artery ...	100
Potash, caustic, poisoning by	153
Pressure, digital... ...	80
.. point	81
Principles of First aid ...	24
Prussic acid, poisoning by	156
Pubes	35
Pulmonary circulation ...	78
Pulse	79
Pupils of eyes	130, 152
Questions on Chapter I.	28
,, ,, II.	72
,, ,, III.	108
,, ,, IV.	121
,, ,, V.	150
,, ,, VI.	159
,, ,, IX.	208
Rabid animals, bites of...	102
Radial artery	95
Radius	35
,, fracture of ...	60
Respiration	125
,, artificial	130, 135, 140
,, to excite ...	141
Respiratory system ...	124
Rest, necessity for ...	25
Ribs	33
,, fracture of	53
Rupture (hernia) ...	121
Sacrum	32
St. John Tourniquet ...	83
Scalds	111
Scalp, bandage for ...	160
,, hæmorrhage from	90
Scapula	33, 58

	Page
Schäfer's method of artificial respiration ...	135
Seat, four-handed ...	170
,, three-handed ...	168
,, two-handed ...	165
Shin-bone	37
Shock	142
,, electric	132
Shoulder, bandage for ...	161
,, blade ... 33,	35
,, ,, ,, fracture of	58
,, joint... ...	39
Sick room, choice and preparation of... ...	200
Signs, meaning of ...	18
Silvester's method of artificial respiration ...	137
Simple fracture	41
Single helper, support by	172
Skeleton	29
Skull	29
fracture of ...	50
Slings, arm	46
Smothering	131
Snake bites	102
Soda, caustic, poisoning by	153
Spleen 118,	120
Spinal canal	30
,, cord ... 30,	123
Spine	30
,, fracture of ..	52
Spirits of salt, poisoning by	153
Splint, angular	60
Splints, rules for applying	49
,, to improvise ...	43
Sprains	70
Sternum 33,	55
Stimulants	26
Stings	114
Stomach 118,	120
,, hæmorrhage from	107
Strains	71
Strangulation	131
Stretcher exercise,	
,, ,, No. I.	178
,, ,, No. II.	188
,, ,, No. III.	193
Stretcher, Furley ...	176
,, Human ...	166
Stretcher, to carry ...	178
,, to improvise	172
Strychnine, poisoning by	157
Stunning	142
Subclavian artery ...	91
Suffocation	132
Sunstroke ... 145,	146
Surgeon's visit, preparation for	207
Surroundings	20
Syllabus of instruction ...	8
Sympathetic system ...	124
Symptoms, meaning of ...	18
Syncope	142
Synovial fluid	38
Systemic circulation ...	76

	Page
Tarsus	37, 68
Temporal artery... ...	90
Thigh-bone	37
,, fracture of ...	62
Three-handed seat ...	168
Throat, hæmorrhage from	106
,, swelling of tissues of	132
Thumb, bandage for ...	214
Tibia	37, 66
Toes, bandage for ...	164
Tongue, hæmorrhage from	106
Tooth socket, hæmorrhage from	106
Tourniquet	81
Transverse wound of abdomen ...	118, 119
Triangular bandage ...	44
Two-handed seat ...	165
Ulna	35
,, fracture of... ...	60
Ulnar artery	95
Unconsciousness ...	127
Upper limbs	33
Varicose veins	101
Veins	76, 101
Venous blood	78
,, hæmorrhage ...	101
Ventricles	76
Vertebræ...	32
Vertebral column ...	30
Vertical wound of abdomen	118, 119
Vitriol, burn by...	111-113
Voluntary muscles ...	40
Wagon, to load or unload	196, 197
Wall, to cross with stretcher	197
Warmth, necessity for ...	25
,, to promote	141, 143
Wind-pipe	125
Woman's dress on fire ...	113
Wounds	80
Wounds by poisoned weapons ...	102
,, accompanied by arterial hæmorrhage ...	80
Wounds accompanied by venous hæmorrhage ...	101
Wounds, lacerated ...	86
Wrist	35, 61

The St. John Ambulance Association.

ABRIDGED PRICE LIST.

A complete and reliable Ambulance Equipment is an actual necessity, and experience has proved that employers of labour and others interested in the district readily subscribe for the purchase of such appliances. All information regarding the work of the Association can be obtained upon application to the Head Office, St. John's Gate, Clerkenwell, London, E.C.

All orders value 20/- or over will be sent **carriage paid** to any part of the United Kingdom. Returns from classes of instruction may be sent carriage forward. If carriage is prepaid it will be allowed.

In order to save delay, it is requested that an amount sufficient to cover postage or carriage may be kindly added to the remittance sent in payment of orders of less value. Any amount sent in excess will be returned.

Owing to fluctuations in market prices it is impossible to guarantee that the quotations herein can be adhered to.

Quotations can be furnished for Ambulance Carriages, motor or horse-drawn, and other articles relating to Ambulance, Nursing and Hygiene, not mentioned in this list.

Orders and correspondence should be addressed to the **St. John Ambulance Association, St. John's Gate, Clerkenwell, London, E.C.**

Remittances should be made payable to the St. John Ambulance Association, and crossed "London County Westminster and Parrs' Bank Ltd., Clerkenwell Branch."

Money Orders and Postal Orders may be made payable at the Clerkenwell Green Post Office.

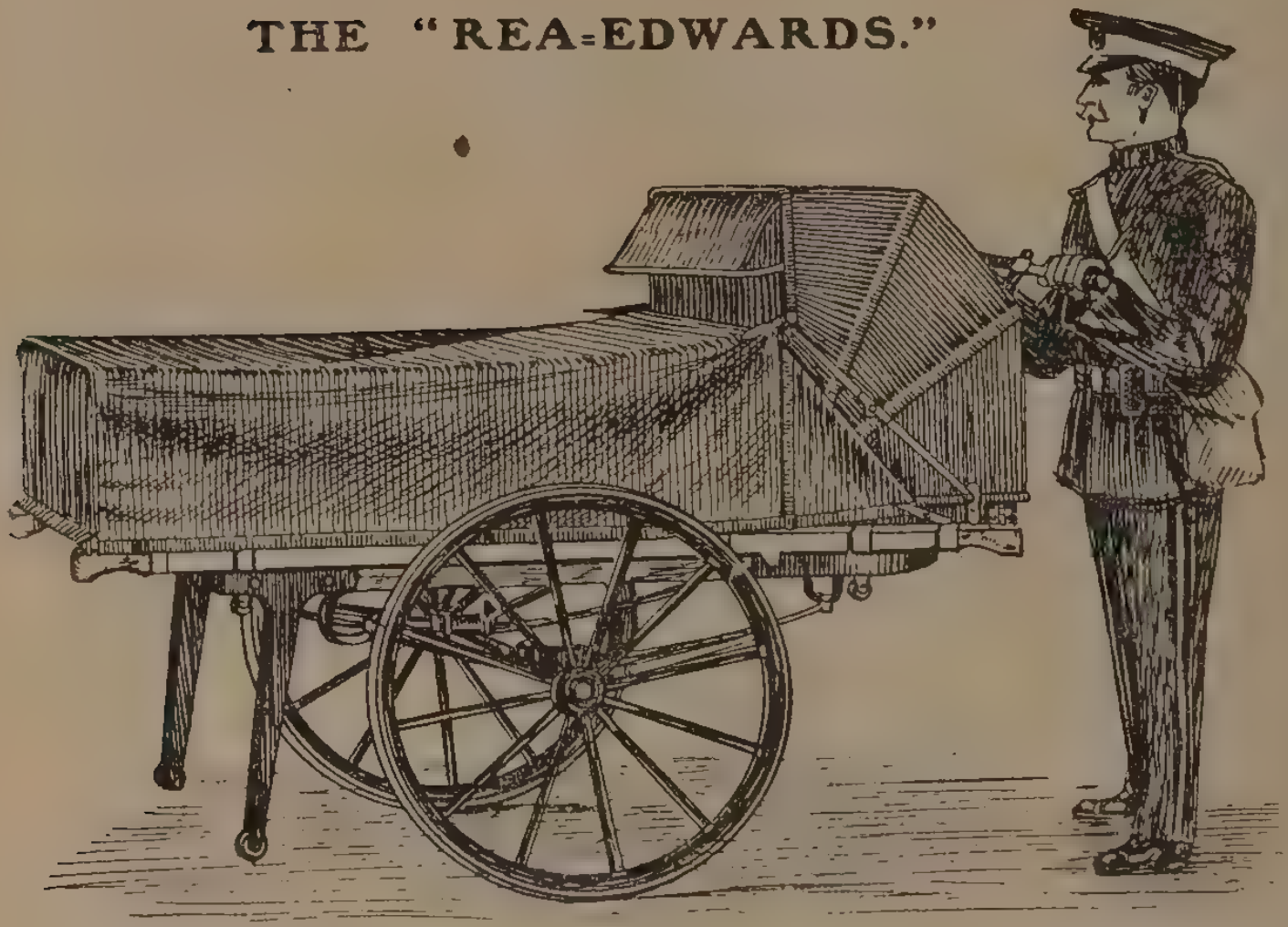
LITTERS.

Each Litter consists of a two-wheeled under-carriage fitted with elliptical springs, and either of the "Furley" stretchers, with a cover so arranged on a jointed frame that it can be folded up inside the stretcher, or with a hood and apron (as shown below). The "Clemetson" stretcher can be used instead of the "Furley" pattern. For prices, see p. 6.

THE "ASHFORD."

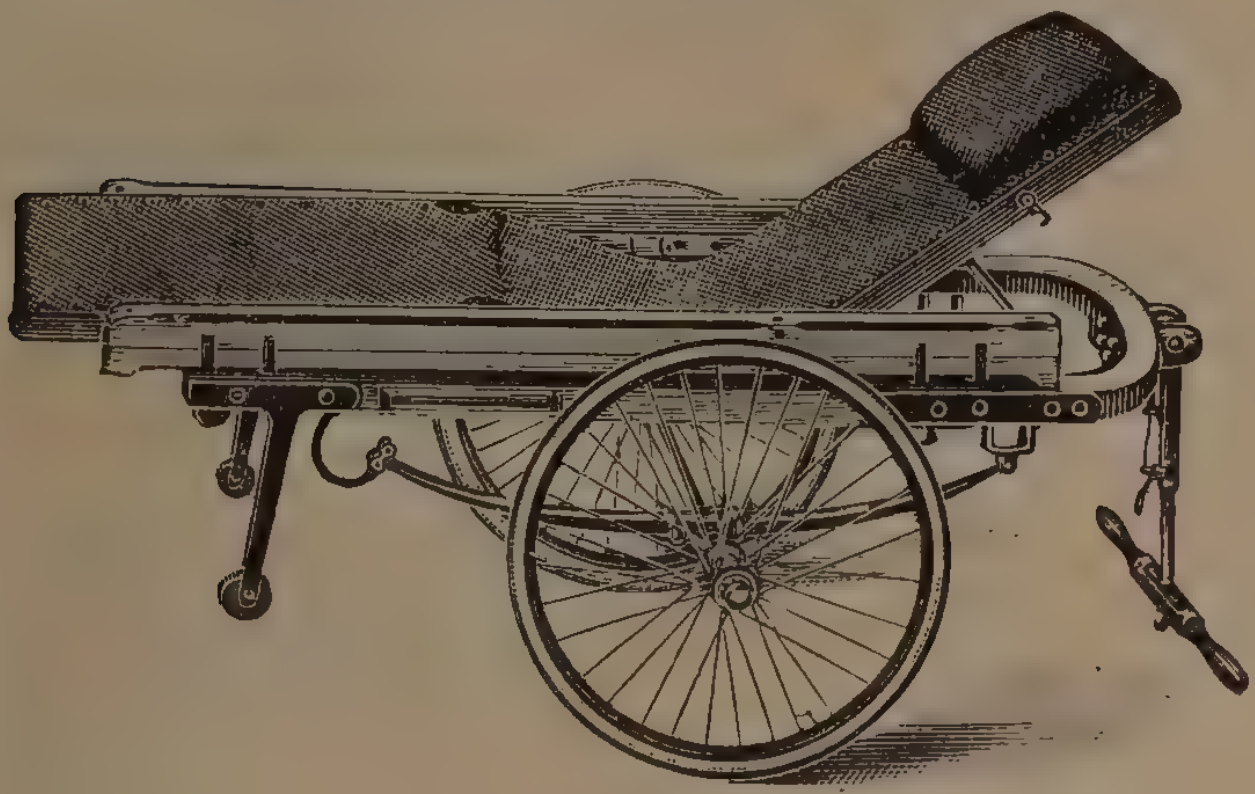
The under-carriage, having a cranked axle, the bearers can pass between the wheels with the stretcher, and thus avoid lifting it over them. When travelling, the legs of the under-carriage are raised, and thus form the handles by which to propel it. Should it be necessary to pass over rough ground, two bearers can easily lift the litter and patient.

THE "REA-EDWARDS."



The under-carriage is fitted either with 28-inch bicycle wheels and extra strong pneumatic tyres, or with light but strong wooden wheels, with solid india-rubber tyres. The height of the wheels permits of a loaded stretcher being lifted over them. **Ball bearings are fitted to the cycle wheels.** A push bar, capable of being raised or lowered, is used at the head end. When raised as a handle it may be locked in one of two positions, and when lowered it is locked in a vertical position.

"REA-EDWARDS" LITTER, fitted with pneumatic tyred wheels, showing the "Clemetson" Stretcher.

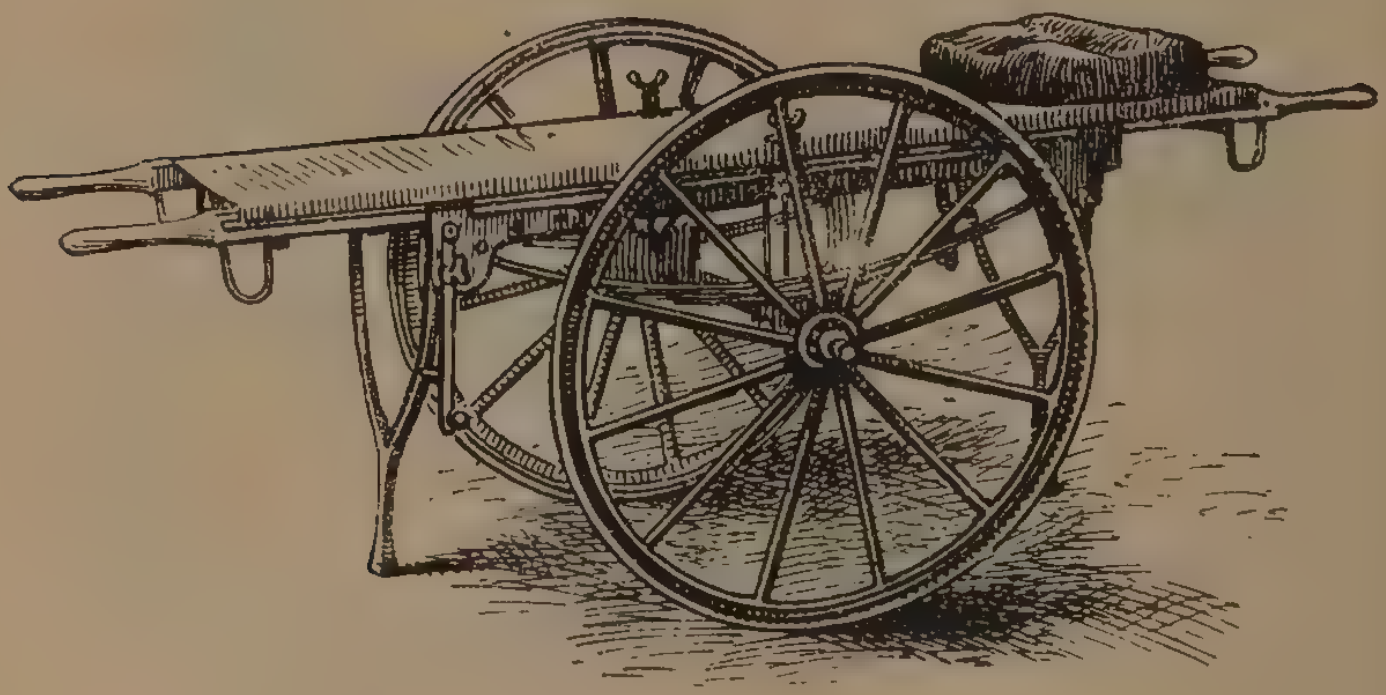


FIRST AID BOX.

To be carried below the axle of the "Rea-Edwards" Litter, from which it is easily detachable.

Contents:—Set of Splints, 12 Triangular Bandages, 12 Roller Bandages, 2 ¼ lb. packets each Cotton Wool and Boric Lint, Adhesive Plaster, Pair of Scissors, Knife. 2 oz. each Tinct. Iodine B.P.C., Sal Volatile, and Boric Acid Powder, Dredger, Graduated Measure Glass, Kidney-shaped Dressing Basin, St. John Tourniquet, Pins, Safety Pins, Needles, Thread, Tape, 2 Saucers, and 2 Camel Hair Brushes. Price £2 10s.

THE "ST. JOHN."



The under-carriage presents some entirely new features, amongst which are the following :— In addition to the "Furley," and "Clemetson" pattern stretchers, it will take the Regulation Military Stretcher. When loaded the patient is balanced over the axle, ensuring comfort in transport, ease in propulsion, and rapidity in manipulation. Portability—the leg or support at each end. when raised goes beneath the frame, and the wheels, which are interchangeable, can be easily and quickly removed. The under-carriage may thus be taken into three pieces, which can be passed through any ordinary doorway and stored in a room or other convenient place. This does away with the necessity for providing the special storage accommodation required for other patterns. The parts can be put together by a single person in two or three minutes.

Carriage Paid on all Orders value 20/- or over in the United Kingdom.

LITTERS.

PRICES OF THE "ASHFORD," "REA EDWARDS," AND "ST. JOHN" LITTERS.

¶ "ASHFORD" and "ST. JOHN" LITTERS	With India Rubber Tyres to Wheels		
	Without Cover or Hood and Apron.	With Cover.	With Hood and Apron, as illustrated.
	£ s. d.	£ s. d.	£ s. d.
Under-carriage (no Stretcher) ...	15 10 6	17 1 9	20 0 6
Litter complete with Ordinary Stretcher (*a*)	—	19 16 11	22 15 8
Ditto with Telescopic handled Stretcher (*b*)	—	20 7 11	23 6 8
Ditto with Police Stretcher (*c*) ...	—	21 13 9	24 12 6
Ditto with "Clemetson" Stretcher	—	—	24 19 6

¶ The price of the "Rea Edwards" Litter is £2 6s. less in each instance.

Prices include (*a*) Wide Webbing Slings but no Chest Strap.

(*b*) Wide Webbing Slings and Chest Strap.

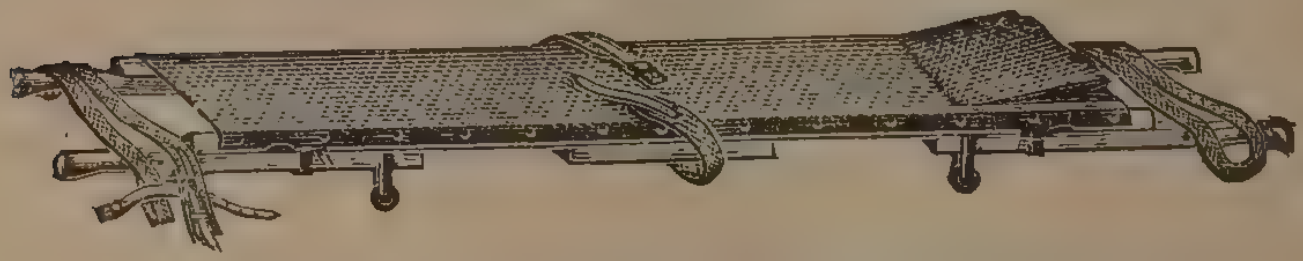
(*c*) Wide Webbing Slings and Leather straps for securing a refractory patient. Leather, instead of Webbing Slings, £1 4s. 10d. extra.

	£	s.	d.
Hood and Apron, "Furley" Stretcher (see illustration, p. 2)	4	6	3
Hood and Apron, "Clemetson" Stretcher	4	12	0
Awning Cover for "Furley" Stretcher (when ordering please state pattern of Stretcher)	1	7	6
Sockets and Studs for fitting Hood and Apron or Awning Cover, per set	0	3	9
Lamp and Bracket	0	10	6

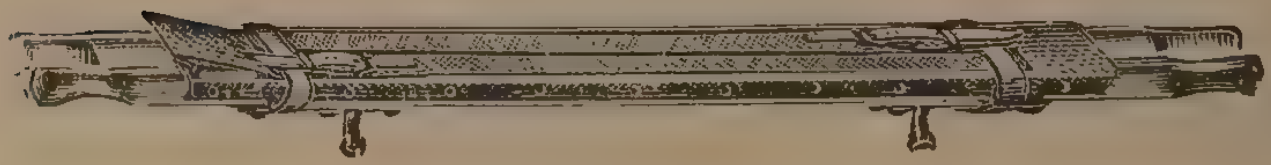
THE "CLEMETSON" STRETCHER.

On this stretcher the patient can be moved as desired, from the recumbent to the sitting position. There is no complicated mechanism to get out of order, and the adjustment depends simply on the balance of the patient's body. The stretcher will fit either Litter under-carriage. Price £4 4s. 6d. ; with extending legs, £5 13s. 6d. (see illustration, p. 4).

"FURLEY" STRETCHERS WITH THE LATEST IMPROVEMENTS.



TELESCOPIC-HANDLED STRETCHER—OPEN.



ORDINARY STRETCHER—CLOSED.

These stretchers are very strong, rigid, light, and fold closely, and can be confidently recommended as thoroughly efficient in every way. The "Telescopic-handled" pattern is more particularly designed for Invalid Transport purposes and for working in confined spaces, such as mines ; the "Ordinary" pattern for general and St. John Ambulance Brigade use. Either can be used with the "Ashford,"

"Rea Edwards," or "St. John" Litters. Should it be necessary to reduce the width of a loaded stretcher in order, for example, to carry it into a railway carriage, this can be done, either when it is resting on the ground or supported by the bearers, without trouble and without the slightest jar to the patient.

PRICES OF THE "FURLEY" STRETCHERS, WITH THE LATEST IMPROVEMENTS.

N.B.—The prices of the Standard Models are shown in heavy type.

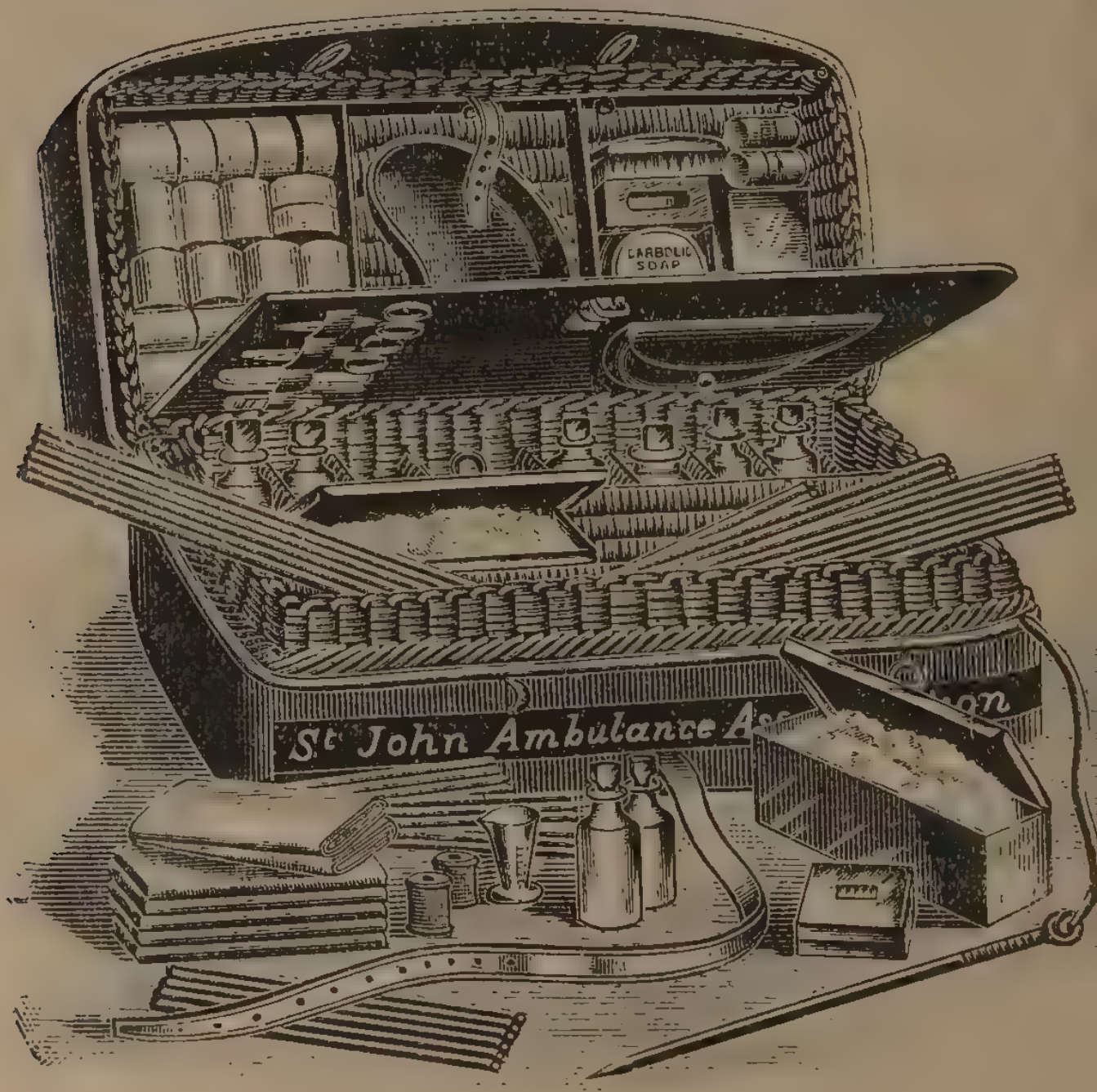
	£	s.	d.
Ordinary Stretcher, for General and Brigade use, with Wide Webbing Slings	**2**	**15**	**2**
Ditto, ditto, with Leather Slings	4	0	0
Telescopic Handled Stretcher, for working in confined spaces, with Wide Webbing Slings and Chest Strap	**3**	**6**	**2**
Ditto, ditto, with Leather Slings and Webbing Chest Strap	4	11	0
Police Stretcher, Ash Poles, Leather Straps, and Webbing Slings	**4**	**12**	**0**
Slings (per pair), Wide Webbing, 6s. 8d. Leather	1	11	6
Spare Bed for Stretcher (when ordering state pattern)	0	13	9
Army Rug to cover Patient on Stretcher	0	16	6
Pillow for Stretcher, stuffed horsehair	0	12	0
Chest Strap, Wide Webbing	0	3	0
Waterproof Sheet (washable) to be laid on the stretcher bed	0	14	6

"Lowmoor Jacket."

For use in mines, ships' holds, etc , to secure a patient on a stretcher, which can then be placed in an upright position. £2 3s. 0d. (When ordering please state pattern of stretcher).

FIRST AID OUTFITS.

LARGE HAMPER FOR AMBULANCE STATION AND RAILWAY PURPOSES.



For contents see next page.

Carriage Paid on all Orders value 20/- or over in the United Kingdom.

The Hamper Contains

1 Set of Splints.

1 St. John Tourniquet.

½ lb. Cotton Wool } In Tin Cases.
½ lb. Lint ... ... }

1 Roll Adhesive Plaster.

20 Roller Bandages, assorted.

1 doz. Triangular Bandages.

3 pieces Tape.

4 oz. Tincture Iodine.

1 Box Ampoules Tincture Iodine.

4 oz. Sal Volatile.

¼ lb. Powdered Boric Acid.

4 oz. Bicarbonate of Soda.

1 Dredger for Boric Acid.

1 pair Artery Forceps.

1 pair Scissors.

1 Knife.

12 Surgeon's Needles.

1 packet each Safety and Plain Pins.

Carbolised Silk.

Silkworm Gut.

1 reel each Black and White Sewing Thread.

1 Kidney-shaped Basin.

1 Stopper Loosener.

1 Graduated Measure.

1 cake 20 per cent. Carbolic Soap.

1 Nail Brush.

3 Empty 8 oz. Bottles.

1 „ 4 oz. „

2 Saucers.

2 Camel Hair Brushes.

Size: Length 24 in. Width 11 in. Depth 10 in. (approx.).

Price complete, £6.

SMALL AMBULANCE HAMPER.

With waterproof cover and strap, for use in factories, collieries, stations, and large works, as well as for parochial and domestic use.

CONTAINING

Set Splints. 1 St. John Tourniquet. Box Ampoules of Tincture of Iodine. 2 Packets Lint. 4 Roller Bandages (wide and narrow). 4 Triangular Bandages, Cotton Wool, Boric Wool (two latter in tin cases), Spool of Adhesive Plaster, Knife, Scissors, Thread, Tape, Needles, and Pins.

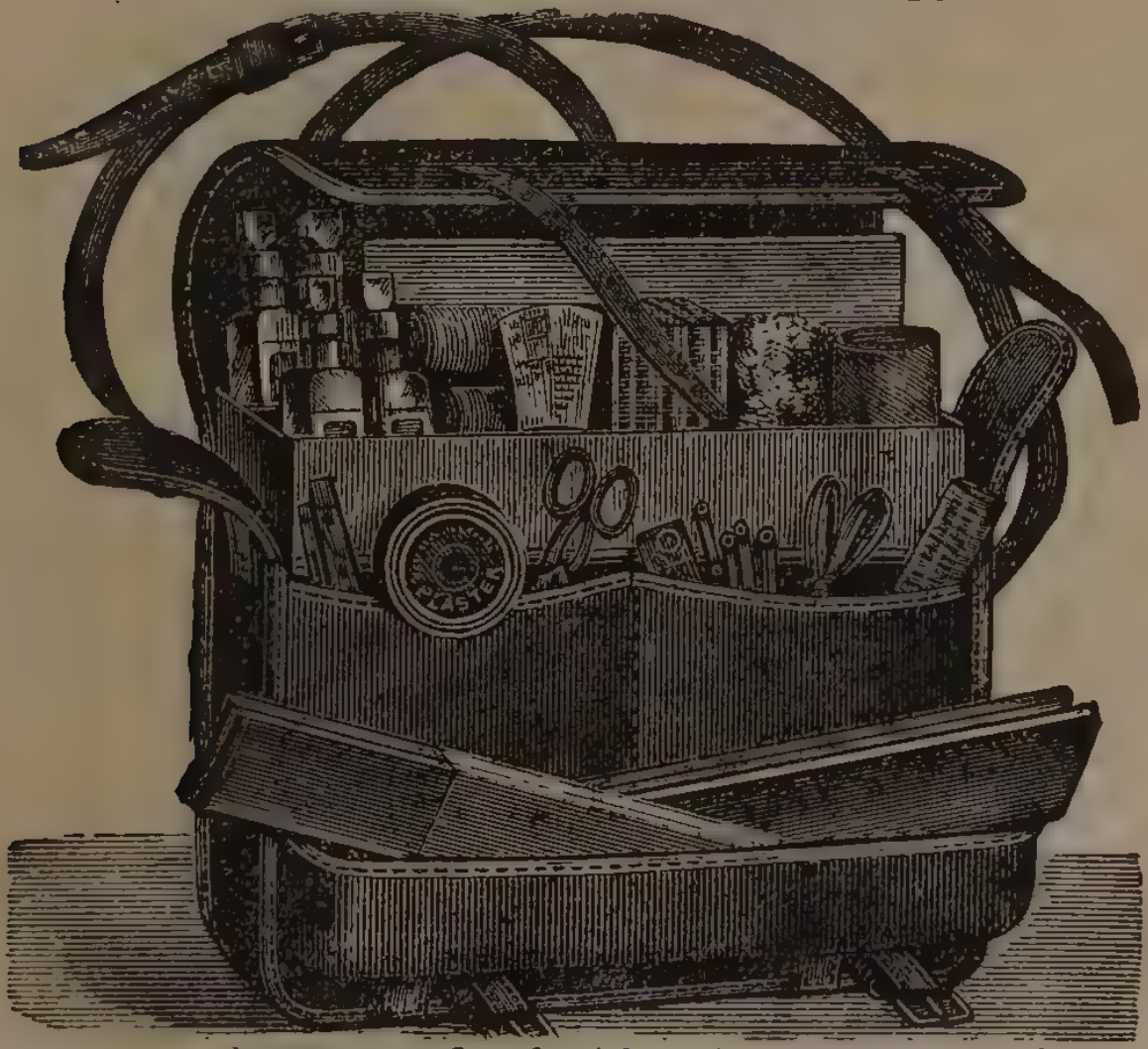
Weight complete, 6½ lbs.

Length, 1 ft. 6 in. Depth, 5 in. Width, 7 in. (approx.).

Price £2.

Carriage Paid on all Orders value 20/- or over in the United Kingdom.

SURGICAL HAVERSAC.

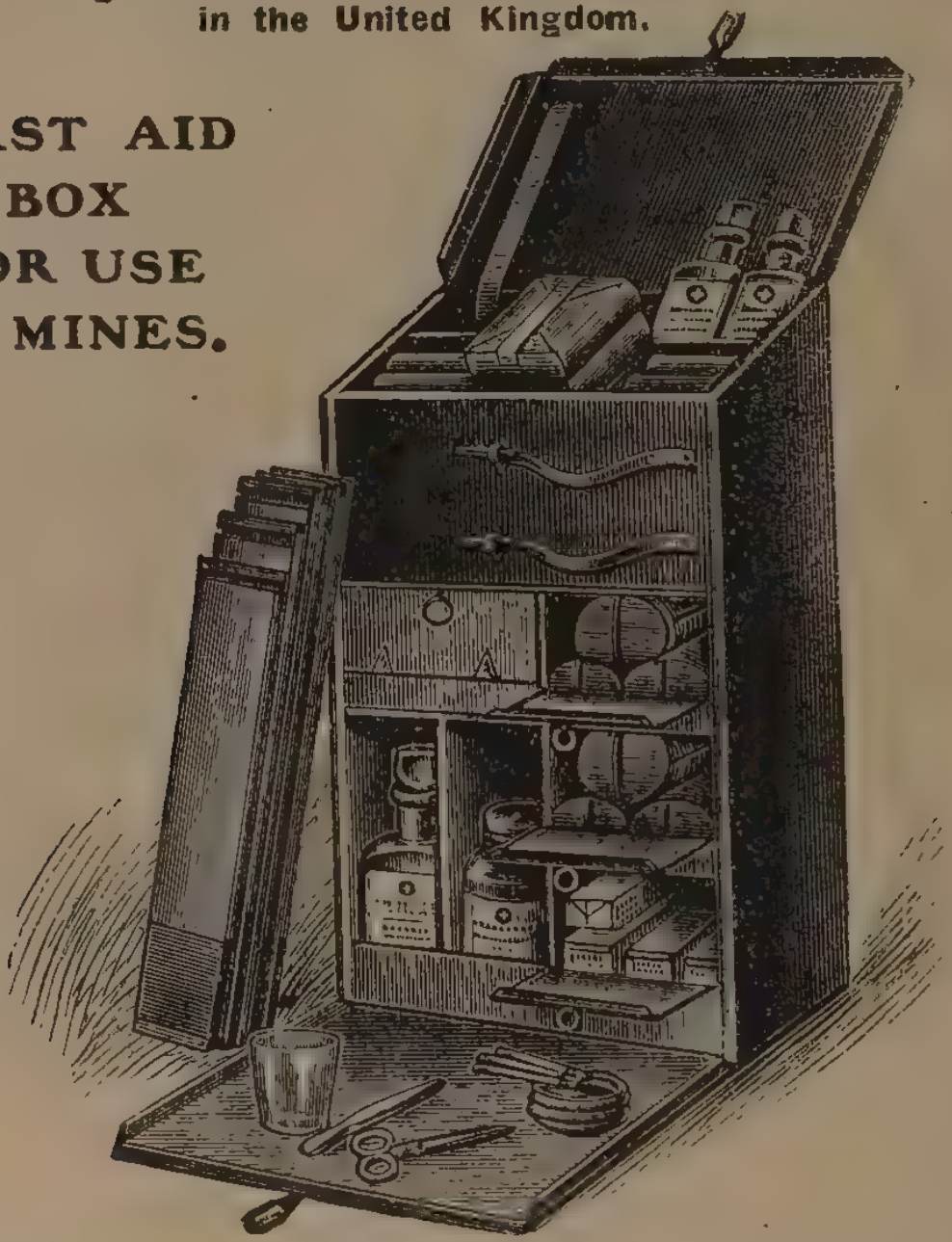


IMPROVED PATTERN, fitted with a tin, so arranged that any article can be taken out without disturbing the rest of the contents.

Contents: 1 Set of Splints, 6 Triangular Bandages, 6 Roller Bandages (wide and narrow), Cotton Wool, Boric Lint, 1 Roll Adhesive Plaster, 1 Pair Scissors, 1 Knife, 2 oz. Tinct. Iodine, 1 Box Ampoules Tinct. Iodine, 2 oz. Sal Volatile, 2 oz. Boric Acid Powder, 1 Dredger, 1 Graduated Glass Measure, 1 St. John Tourniquet, Pins, Needles and Thread, 2 Saucers, 2 Camel Hair Brushes. Price £2 5s.

White Ration Haversacs, 3s. 4d. each.

FIRST AID BOX FOR USE IN MINES.



CONTENTS.

Set of Improved Wooden Splints; St. Joan Tourniquet; Cotton Wool; Lint; 12 Compressed Roller Bandages, assorted; 6 Triangular Bandages in waxed paper; Adhesive Plaster; Pair Scissors; Graduated Measure; 2 oz. Sal Volatile; 8 oz. Boracic Powder; 8 oz. Tinct. Iodine; Box Ampoules Tincture Iodine; Dredger; 2 Saucers; 2 Camel Hair Brushes; Pins; Safety Pins. PRICE COMPLETE, £3

This First Aid Equipment is also very suitable for use in factories and other large works, and can be fitted for carrying on the "Ashford" Litter.

Carriage Paid on all Orders value 20/- or over in the United Kingdom.

FIRST AID OUTFIT

for use in Factories and Workshops— Welfare Order, 1917.

CONTENTS.

All Dressings are sterilized.

3 doz. Finger Bandages, 1 doz. Hand and Foot Bandages, 1 doz. Large Dressings, 6 Burn Dressings, 2 oz. Carton Cotton Wool, 6 Ampoules of Tincture of Iodine, 1 Bottle of Eye Drops (Solution No. 1), 1 Bottle of Eye Wash (Solution No. 2), 1 Dredger of Bicarbonate of Soda. First Aid instructions based on those issued by the Factory Dept. of the Home Office.

Price £1 17s. 6d.

FIRST AID COMPRESSED KIT.

The box is made of wood covered with damp-resisting material, and is fitted with a lock and key. It contains a number of practical First Aid appliances arranged so that any article can be withdrawn or replaced without disturbing the remainder. Being fitted with a handle it is portable, and the lid, when let down, can be used as a table. All bandages and dressings are compressed. Size—Length, 16¾ in.; width, 4½ in.; height, 8 in. (approx.), without handle.

Contents: 4 Triangular Bandages, 6 Roller Bandages, 4 First Aid Dressings, 6 Small Packets of Cotton Wool, 6 Small Packets of Boric Lint, 1 St. John Tourniquet, 1 Measure Glass, 1 tin box containing a Roll of Plaster, Boric Lint Patches, Scissors and Pins, 1 tray containing 3 Bottles (Sal Volatile, Tincture of Iodine and Boric Acid Powder) and a Dredger, 1 set of improved Splints, with angle piece, 8 Splint Straps (sufficient for a fractured thigh), 2 Saucers, 2 Camel Hair Brushes.

Price £2.

Carriage Paid on all Orders value 20/- or over in the United Kingdom.

SMALL FIRST AID OUTFIT.

When closed can be carried by a strap-handle.

Dimensions—9¾ by 7¾ by 6½ inches (approx.).

CONTENTS: 2 Triangular Bandages, 1 St. John Tourniquet, 8 Splint Straps (for securing Splints in lieu of Bandages), 2 oz. Cotton Wool, 2 oz. Plain Lint, 4 1-in. and 2 2-in. Roller Bandages, 1 2-oz. Bottle Sal Volatile, 1 2-oz. Bottle Tincture Iodine, B.P.C., 1 Pair of Scissors, 1 2-oz. Measure Glass, 2 China Saucers, and 2 Camel Hair Brushes to be used when applying Tincture of Iodine.

Price:

Wooden Box, covered with Damp Resisting Material, £1 4s.

Stout Cardboard Box, Cloth Covered, 18s.

Size, 4½ by 3¼ by 1¼ inches (approx.). Suitable for the pocket.

CONTENTS.

1. 2 Finger Bandages. 2. Hand or Foot Bandage. 3. Burn Dressing. 4. Two Splint Straps. 5. Adhesive Plaster. 6. 2 Ampoules of Tincture of Iodine. 7. Boric Lint Patches. 8. Safety and Plain Pins.

Price, each 2s. By Post 2s. 4d. Per doz. 23s. 6d.

SEPARATE ARTICLES.

No.		No.	
1	each 1d.	5	per box 1½d.
2	„ 2d.	6	each 2d.
3	„ 4d.	7	per packet 1d.
4	per strap 3d.	8	„ „ 1d.

Roller Bandages (6 yards long).

Per doz.	Grey Calico. s. d.	Grey Open Wove. s. d.	Superior White Open Wove. s. d.
1 in.	2 6	1 8	1 10
1½ in.	3 7	—	2 9
2 in.	4 8	3 7	3 9
2½ in.	5 9	4 3	4 9
3 in.	6 10	5 4	5 6
4 in.	9 6	—	7 6
6 in.	14 0	—	11 0

BANDAGES, DRESSINGS, PLASTERS, AND SUNDRIES.

Triangular Bandages—Plain, each 8d. ; per doz., 7s. 9d. **Illustrated,** showing 25 applications of the Triangular Bandage, with printed instructions, each 1s. ; per doz., 12s.

Cotton Wool—Plain, 1 oz., 3½d. ; 2 oz., 6d. ; 4 oz., 11d. ; ½ lb., 1s. 9d. ; 1 lb., 3s. 4d. ; small packet (Compressed), 2d. **Medicated,** Boracic, ¼ lb., 1s. ; 1 lb., 3s. 10d. ; Other Wools by special quotation.

Lint—Plain, 1 oz., 4d. ; 2 oz., 7½d. ; 4 oz , 1s. 2d. ; ½ lb., 2s. 3d. ; 1 lb , 4s. 4d. **Boracic,** 1 oz., 3½d. ; 2 oz., 6½d. ; 4 oz., 1s. ; 8 oz., 1s. 10d. ; 1 lb., 3s. 6d. ; small packet (Compressed), 2d.

Gauzes.—These are supplied in 6 yard lengths, width about 36 inches. Unmedicated white, Alembroth, Double Cyanide, Boracic. Packets of Cyanide Gauze (1 yard Compressed). Prices on application.

Owing to constant fluctuations in market prices the above quotations are only approximate.

Ambulance Station Plate, Enamelled Iron, ... 3s. 6d.

Stretcher Depot Plate, Enamelled Iron, ... 3s. 6d.

Carrying Sheet for carrying patients up and down stairs or otherwise about a house. The sheet is fitted with rope handles and detachable bamboo poles, and may be placed on a stretcher without disturbing the patient. 32s.

	s.	d.
Dressing Basin, kidney shaped, of enamelled iron ...	3	3
The St. John Tourniquet, as supplied to the Admiralty, with directions for use	1	0
Splints, Wooden jointed, per set	3	0
Greatly improved Wooden Splints, with grooved joints and angle piece, strongly recommended ...	6	0
Splint Straps, for securing Splints in lieu of Bandages, consisting of strong 2 in. Webbing, and suitable Buckles. Per set of eight assorted lengths, sufficient for a fractured thigh	2	9

Buckles only, 1s. 3d. per doz. Webbing only, 3s. per doz. yards.

It is unnecessary to sew the Buckles. The spikes should be passed through the webbing, the short end of the webbing lying outwards.

Tow, for splint padding ... ...per lb.	1	0
First Field Dressing (Army Pattern)	1	0
First Aid Dressing, consisting of a small compressed packet of boric lint, a compressed roller bandage, and a safety pin	0	3
Dredger, containing boric acid powder ... 1s. and	1	4
Measure Glass	0	11
Knife with strong blade ... ... each	2	0
Pair of Scissors ... ... each	3	3
Small Bottles Smelling Salts each 6d. ; per doz.	5	6

Flags.—Association—5 ft. by 3 ft., 12s. 6d.; 12 ft. by 6 ft., £1 7s. 6d. Brigade (New Design)—6 ft. by 4 ft., £2 2s. 6d.; 9 ft. by 6 ft., £3 17s. Brigade Pennon—3 ft. 3 in. by 7 ft. 6 in., £2 10s.; 5 ft. 4 in. by 12 ft. £4 13s.

Electrotypes for printing the official stationery of A, The St. John Ambulance Association, and B, The St. John Ambulance Brigade. A or B—Badge only. AH or BH—Badge and Heading. No. 1 for Post Cards, No. 2 for Note Paper, A, B, AH or BH, each 3s. No. 3 for Quarto and Foolscap paper—A or B, 3s.; AH or BH, 3s. 4d. No. 4 for Small Posters, A or B only, 3s. 1d.; No. 5 for Large Posters, 3s. 8d.

Plasters.—Leicester Adhesive Plaster on Cambric, in tins of ½ yard, 6 in. wide, 9d. The Leicester Adhesive Ribbons, in tin boxes, 6 yards long, ½ in. wide, 1s. 2d.; 1 in. wide, 1s. 5d. National Rubber Adhesive Plaster (Antiseptic) on spools—½ in. wide, 5 yards 11d., 10 yards 1s. 6d.; 1 in. wide, 5 yards 1s. 2d., 10 yards 2s. 2d.; 2 in. wide, 5 yards 2s., 10 yards 3s. 4d. In card box—½ in. wide, ¾ yard long, 2d. In tin box—1 in. wide, ¾ yard long, 3d.; ⅝ in wide, 2 yards long, 3d.; ½ in. wide, 5 yards long, 6d.; ¾ in. wide, 5 yards long, 1s.

Safety Pins (All fasten or unfasten on either side).

Empire, No. 1, 2½d.; No. 2, 3d.; No. 3, 3½d. per doz. Box of 3 doz. assorted, 9d.

Special Blanket Safety Pins, 3 in. 1s. 6d., 3½ in. 2s. 3d. per doz.

TEXT BOOKS, &c.

"**First Aid to the Injured.**" By Sir James Cantlie, K.B.E., M.B., F.R.C.S. (Revised by a Committee 1917.) The authorised Text Book for the First Aid Course. 1s. 6d. By post, 1s. 8d.

"**A Catechism of First Aid.**" Compiled from Sir James Cantlie's Manual. By J. M. Carvell, M.R.C.S., L.S.A. (Revised 1917.) 9d. By post, 10½d.

"**Problems in First Aid.**" A companion to the authorised Text Book of the St. John Ambulance Association "First Aid to the Injured." By the late L. M. F. Christian, M.B., C.M., Ed., and W. R. Edwards, A.C.A. 10d. By post, 11½d.

"**Home Nursing.**" Compiled by a Committee principally from the original manuscript, written at the request of the Association by Mildred Heather-Bigg, R.R.C., Matron of Charing Cross Hospital. The authorised Text Book for the Nursing Course. 1s. 6d. By post, 1s. 8d.

"**A Catechism of Home Nursing**" (based on the authorised Text Book). By J. M. Carvell, M.R.C.S., L.S.A. 9d. By post, 10½d.

"**Home Hygiene.**" By John F. J. Sykes, D.Sc. (Public Health), M.D., &c. Illustrated. The authorised Text Book for the Home Hygiene Course. 1s. By post, 1s. 2d.

"**A Catechism of Home Hygiene**" (based on Dr. Sykes' Text Book). By J. M. Carvell, M.R.C.S., L.S.A. 6d. By post, 7½d.

"**Notes on Military Sanitation.**" By Lieut.-Col. H. P. G. Elkington, R.A.M.C. 6d. By post, 7½d.

TEXT BOOKS, &c.—*Continued.*

"Questions and Answers upon Nursing." By John W. Martin, M.D. 1s. 6d. By post, 1s. 7½d.

"Elementary Bandaging and Surgical Dressing." By Walter Pye, F.R.C.S. 4s. 6d. By post, 4s. 8d.

"To Restore the Apparently Drowned," printed in large Type with two diagrams. 2d. By post, 3½d.

"Manual of Drill and Camping for the St. John Ambulance Brigade." 1s. By post, 1s. 2d.

"Manual for St. John Voluntary Aid Detachments." By Lieut.-Col. G. E. Twiss, R.A.M.C. (Retired Pay). 6d. By post, 7½d.

"First Aid Principles." Cards of concise directions for waistcoat pocket. ½d. each; 4d. per doz. By post 5½d. Special quotations for large quantities.

"Specimen Examination Papers, First Aid, Nursing and Hygiene Courses." 3d. By post, 4½d.

Small Anatomical Diagram. Showing the human skeleton, main arteries, and points where pressure should be applied to arrest bleeding. 2d. By post, 3½d. Post Card size for pocket, 1d. By post, 2d.

Directions as to the Restoration of Persons suffering from Electric Shock. Large print, poster size. 3d. each. By post, 4½d.

General Notes on First Aid to be Rendered in Cases of Poisoning. By Milnes Hey, M.A., M.R.C.S., L.R.C.P. 2d. By post, 3½d.

TEXT BOOKS, &c.—(*continued*).

"Order of the Hospital of St. John of Jerusalem and its Grand Priory of England." By H. W. Fincham, assisted by W. R. Edwards. 100 pp., crown 4to., on antique laid paper, with 23 Plates on Art Paper. Bound cloth boards, gilt lettered, price 6s. (packed for post 6s. 6d.). Cheaper Edition, paper covers, price 2s. (packed for post 2s. 3d.).

General Regulations for the St. John Ambulance Brigade, 1913. 3d. By post 4½d.

Rules for Corps and Divisions, St. John Ambulance Brigade. 2d. By post, 3½d.

Registers. Class Attendance, 2s. 6d. By post, 2s. 10½d. Certificates, 4s. 6d. By post, 5s. Case Report, 1s. 8d. By post, 1s. 11½d.

St. John Ambulance Brigade Cash Book, Minute Book and Occurrence Book. Set of three, 13s. By post, 13s. 6d. **Receipt Book,** 1s. By post, 1s. 2d.

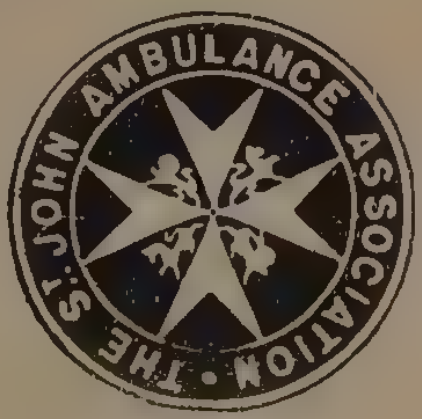
Large Physiological Diagrams (New Series). For Lecturers' use. The Human Skeleton, showing the main arteries and pressure points. The General Anatomy of the Body. The Systemic and Pulmonary Circulation of the Blood. Section Through Middle Line of Head and Neck, showing the Tongue in two positions in relation to the Trachea, and Schäfer's method of Artificial Respiration (Expiration and Inspiration). Dislocations. Price, per set of five £1 6s. These may be hired for a course of "First Aid" lectures, given under the auspices of the Association, for a fee of 5s., or with the addition of Splints, Tourniquet, and 30 plain Triangular Bandages, for a fee of 12s. 6d.

Boxes of Stationery for the use of Class Secretaries and others connected with the Association, containing twelve sheets of high-class paper, suitably headed, and twelve envelopes bearing the device of the Association. 6d. By post, 8d. Twice that quantity, 1s. By post, 1s. 4d.

Carriage Paid on all Orders value 20/- or over in the United Kingdom.

BADGES.

Nos. 3 and 6.



Nos. 7 and 8.

(Actual size.)

Badges, with the device, issued under the authority of the Central Executive Committee, having been first approved by H.R.H. the Grand Prior as the sole official and recognised Badge of the Association and Brigade.

N.B.—This design is protected.

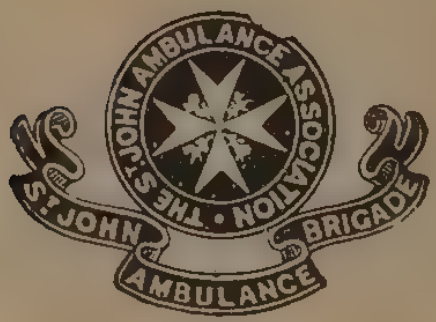
SERIES A.—For the use of individual certificated pupils—

No.			s.	d.
1.	**In Nickel Silver,** Large Size ...	2 in. dia.	0	7½
2.	Ditto, Small Size	1¼ ,,	0	6
3.	Ditto, Small Size for button hole ...	1 ,,	0	6
4.	**In Electro Plate,** Large Size ...	2 ,,	1	3
5.	Ditto, Small Size	1¼ ,,	1	0
6.	Ditto, Small Size for button hole ...	1 ,,	1	0
7.	**In Enamel** for button hole	1 ,,	1	0
8.	Ditto, as brooch	1 ,,	1	3
9.	In Cloth and Silk	1¾ ,,	0	9
10.	In Cloth and Silver	2 ,,	3	0
11.	In Cloth and Cotton	1¾ ,,	0	6
12.	Small Celluloid Badge, for button hole or brooch	⅞ ,,	0	2
13.	White Satin Armlet, with woven Badge	2¼ ,,	0	8½

N.B.—These Badges are not to be worn as decorations.

BADGES.

Nos. 15 to 18 (Reduced)



No. 19 (Actual Size).

SERIES B.—For members of the St. John Ambulance Brigade, not wearing uniform, having the name of the Corps or Division annexed on a label, only issued in quantities—

No. 15. In Nickel Silver, 2 ins. in diam., first doz., £1 2s. 6d.; subsequent dozs., 13s.

,, 16. In Electro Plate, 2 ,, ,, first doz., £1 12s.; subsequent dozs., £1 4s.

,, 17. In Cloth and Silk, 2 ,, ,, per doz., 15s.

,, 18. In Cloth and Silver, 2 ,, ,, per doz., £2 10s. 0d.

,, 19. The "Brigade" button hole badge, each, 1s.; with brooch pin, each 1/3

N.B.—These badges are not to be worn as decorations.

UNIFORMS FOR AMBULANCE UNITS

Of the ST. JOHN AMBULANCE BRIGADE.

These may be obtained from

HAZEL & CO.

(sole proprietor, D. HAZEL, for many years associated with the late firm of Hebbert & Co., Ltd., as Director),

UNIFORM CLOTHING & EQUIPMENT MANUFACTURERS,

16, NILE STREET, CITY RD., LONDON, N.1.;

and at 6, York Place, Leeds;

and 84, Miller Street, Glasgow.

Telephone: London Wall 1962.

Telegrams: "HAZELISM, HOX., London."

Prices, Patterns and Self Measurement Forms will be forwarded on request.

OFFICERS.

TUNIC, Superfine Black Vicuna.

TROUSERS " " "

BELT, Sam Browne, with Brace.

GLOVES.

CAP.

GREATCOAT. Grey Beaver or Melton.

MACKINTOSH.

UNIFORMS (*continued*).

FIRST-CLASS SERGEANTS, SERGEANTS, CORPORALS AND PRIVATES.

TUNIC, Black Tartan.
TROUSERS, Black Tartan.
WAISTBELT AND POUCH, Brown Leather, White or Oxidized Fittings.
CAP.
GLOVES, White Cotton.
LEGGINGS, Black Leather.
WATERBOTTLE and Leather Carrier.
HAVERSACK, White Duck.
GREATCOAT, Dark Grey Melton.

DRAB SERGE UNIFORM.

JACKET, Drab Mixture Serge.
TROUSERS ,, ,, ,,
CAP ,, ,, ,,
GREATCOAT, Drab Melton.

All Uniforms are strictly to the latest Dress Regulations issued by the Headquarters, ST. JOHN AMBULANCE BRIGADE, St. John's Gate, Clerkenwell, E.C. 1.

HAZEL & CO.,
16, Nile Street, City Road, London, N. 1.

THE UNIFORMS, CLOAKS, BONNETS, APRONS, DRESSES, ETC.,

FOR THE

ST. JOHN AMBULANCE BRIGADE,

MAY BE OBTAINED AT

E. & R. GARROULD.

To H.M. War Office.
H.M. India Office, Colonial Office,
London County Council, Etc.

AN
ILLUSTRATED PRICE LIST

of the various articles
required by the

ST. JOHN AMBULANCE BRIGADE
ON APPLICATION.

PATTERNS
AND
PRICES
POST FREE.

150 to 162, Edgware Road,
LONDON, W.

ST. JOHN AMBULANCE BRIGADE.

UNIFORMS FOR NURSING UNITS.

THESE GOODS MAY BE OBTAINED FROM—

Messrs.

E. & R. GARROULD,

150 to 162, EDGWARE RD.,
LONDON, W.

CLOAK (Badge extra).

BONNET { Nursing Sister's.
„ Officer's.

DRESS { Nursing Sister's Dress Length.
„ Officer's „ „

COLLARS.

CUFFS.

CAP { Nursing Sister's.
„ Officer's.

APRON.

„ also in Pure Irish Linen.

PRICES UPON APPLICATION.

ILLUSTRATED PRICE LIST FREE.

Telephones—
5320, 5321, & 6297,
PADDINGTON.

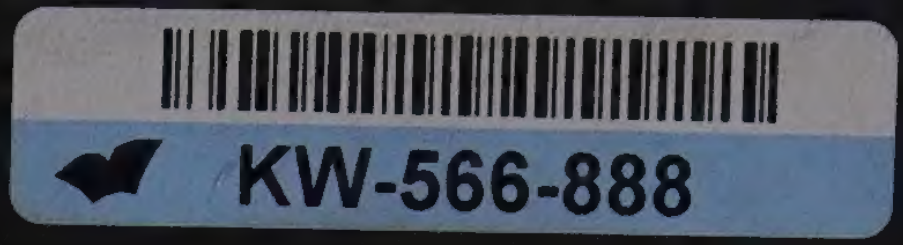
Telegrams—
"GARROULD,
LONDON."

INDEX TO PRICE LIST.

For General Index see page 220.

	PAGE
Ambulance Hampers...	9 to 11
,, Station Plate ...	19
Awning Cover for Stretcher	6
Badges, &c.	24, 25
Bandages	18
Basin, Dressing	19
Books	21 to 23
Carrying Sheet	19
Cash Book	23
Cotton Wool	18
Diagrams, Large	23
,, Small	22
Dredger (Boric Acid) ...	19
Dressing Basin	19
Electrotypes	20
First Aid Box ...	4, 13, 14, 16
,, ,, Companion... ...	17
,, ,, Compressed Kit ...	15
First Field Dressings... ...	19
Flags	20
Gauzes	18
Hampers (Ambulance)	9 to 11
Haversacs	12
Hood and Apron for Litter ...	2, 6
Knife	19
Lamp	6
Lint	18
Litter (Ashford)	2, 6
,, (Rea-Edwards)	...3, 4, 6
,, (St. John)	5, 6

	PAGE
Lowmoor Jacket	8
Measure Glass...	19
Minute Book	23
Occurrence Book	23
Pillow, Stretcher	8
Plasters	20
Receipt Book	23
Registers	23
Roller Bandages	18
Rug (Army)	8
Rules for Corps or Divisions St. John Ambulance Brigade	23
Safety Pins	20
Scissors	19
Slings (Stretcher)	8
Smelling Salts	19
Splint Padding	19
,, Straps	19
Splints	19
Stationery	23
Stretcher Depot Plate ..	19
Stretchers	7, 8
Text Books	21 to 23
Tourniquet (St. John) ...	19
Tow (carbolized)	19
,, for Splint Padding ...	19
Triangular Bandages... ...	18
Uniforms	26 to 29
Waterproof Sheet	8
Wool (Cotton)	18


KW-566-888